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FOOD MANUFACTURE

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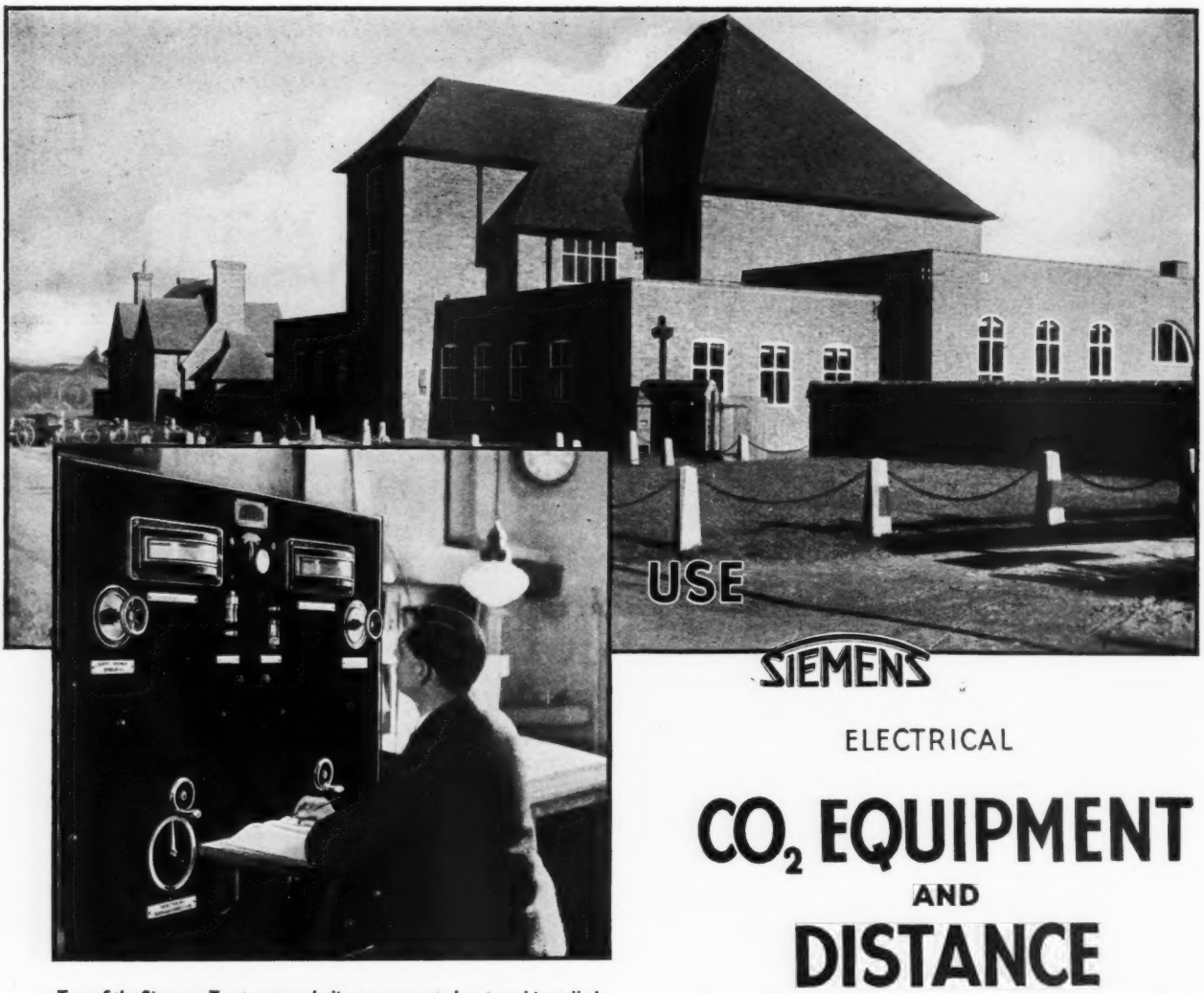
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

(FOOD INVESTIGATION)



Two of the Siemens Temperature Indicators mounted on panel installed in the Engineer's Office at Ditton Laboratory, East Malling, showing the temperature being noted for record purposes. Each of the Indicators is connected to 100 portable thermometers. A view of the premises is shown above.

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FOOD MANUFACTURE

Vol. X, No. 9 September, 1935

Prosperous Factories

THE SUGAR beet factories continue to prosper. The English Beet Sugar Corporation is distributing £300,000 as a cash bonus—12s. on a £1 share! The Ely Beet Sugar Factory is distributing 13s. 4d. per £1 share. The Ipswich Factory is doling out 7s. per £1 share. The explanation offered for these distributions is amusing—" It is because the restriction on acreage has made factory expansion remote ". We would point out that there is no restriction on total acreage. The only restriction is an acreage eligible for the subsidy! Obviously the growers only intend to produce subsidy beet. Apart from these bonuses dividends have been higher in sugar beet than in most other industries. The Central Sugar Co. is paying 15 per cent. tax free, the Yorkshire Sugar Co. is managing to pay 15 per cent. tax free against 8 per cent. less tax last year. The Shropshire Beet Co. has managed 10 per cent. on the ordinary shares and 20 per cent. on the deferred shares. These examples are but a few of what could be adduced to show the iniquity of the whole question of subsidised sugar beet.

When Doctors Differ

There has recently been some very interesting correspondence among medical men in *The Times* relative to the value of sugar. Sir Leonard Hill started it by suggesting that the beet sugar subsidy might be better spent, and recommending that it should be used for furthering the production of the protective foods rich in vitamins. It was pointed out that the teeth of children who can afford to buy sweets are very liable to decay. This brought a rejoinder from another doctor, who stated that there was an impressive weight of data against the inference that the consumption of cane sugar favoured dental decay. One doctor contributed some amazing statements, one of which was that an average lump of sugar contains as much sugar as a yard of cane, but a native child makes a yard of cane last a day, and as he chews it he swallows large quantities of saliva which go a long way towards digesting it. As Dr. Cole of Cambridge pointed out, cane sugar is not digested by the enzymes of the saliva, so that by prolonged mastication the native child produces no beneficial results in this direction. Then again it was stated that " the gross excess of sugar accumulates in the lower reaches of the intestine undigested and forms a food for pathogenic microbes ". Actually it is impossible for sugar to accumulate in the lower reaches of the intestine, and, as Dr. Cole again pointed out, " the lurid picture of it serving as a food for pathogenic microbes is ridiculous ". If any soluble carbohydrates did exist in the intestine they would be converted to lactic and other acids, the production of which inhibits the formation of toxic substances from protein. These discrepancies of opinion expressed by qualified medical men about such an important article of food as sugar are alarming, and the whole question should be gone into thoroughly and the true facts ascertained.

Bread Consumption

It is a remarkable anomaly that as the world production of wheat has increased to surplus point the *per capita* consumption of bread has fallen. There have been many attempts to explain the decline, but so far no really satisfactory explanation is forthcoming. Whatever may be the cause, the Millers' Mutual Association, in conjunction with the baking industry, is making strenuous efforts to improve matters by advertising the great virtues of bread as a food. Whether this campaign will meet with success is difficult to say, but it must be realised that the decline in bread eating is not confined to Great Britain; it is worldwide. The United States was one of the first countries to realise this, and measures were adopted there to check it by producing richer bread to attract public taste. This was well advertised, but it did not solve the problem. Really the virtues of bread eating should have been sung years ago before the decline had got really serious. By this time some other foodstuff has become a recognised part of the

diet and has replaced wheat. It will be a very difficult matter to reverse the position. It certainly behoves millers to use only the best wheat available and to mill really good flour, and the bakers should refrain from hanky-pankying with dodges to obtain increased volume and more loaves per sack. If this is done, although it may not restore bread consumption to its former level, it may at any rate prevent the decline going any further.

The American Position

Some interesting observations on this question of the decline of bread consumption were made by Eyerly, Oclassen, and Killian at the Biological Section of the Cleveland Meeting of the American Chemical Society in September of last year. Their paper was entitled "Observations on the Nutritional Value of Bread in the Diet of Human Subjects and Experimental Animals", and was published in the July, 1935, issue of *Cereal Chemistry*.

Chemistry

They point out that, during the first three decades of the twentieth century, the *per capita* consumption of wheat flour in the United States declined by 31 per cent., due chiefly to a decrease in the popular use of bread.

The reasons for this decline, which have at various times been adduced, are interesting. Some authorities have fixed the blame on a decrease in the demand for energy-producing foods occasioned by the steadily increasing replacement of human labour by machines during the last two decades. This explanation, however, is not supported by the statistics of Pearl (1925), which indicate that during the past twenty years the decrease in the average man's daily intake of calories is not more than 2 per cent.

Faddists

Notions, popularised by faddists, concerning the alleged nutritional deficiencies or deleterious effects of food products prepared from cereals have probably had an influence. For example, Green and Mellanby's work in 1928 on rickets appears to have given rise to a belief that cereal foods may be harmful because they retard the normal processes of calcification. However, Cowgill, Jones, Frisch, and Jackson (1927) contradicted this idea, and they state that their investigations demonstrate conclusively that cereals may be used by man to a much greater extent than is common, and that nutritive success with high cereal rations is primarily a problem of providing suitable supplements.

Slender Bodies

The authors point to another trend in the changing food habits of the nation which is probably affecting bread consumption, and this is the reduction of carbohydrates in an effort to attain "slender body forms at any price".

Personally, our opinion of this bread reduction problem is that the chief cause is to be sought in the great increase in the variety of attractive foods which compete for a place on the table. The time is past when we had little choice beyond beef, bread, and beer; now we are faced with a tempting array of tit-bits from the can and bottle—fruits, salads, cereal breakfast and other prepared foods, and the like. We have a greater variety and less bulk of any single item. Probably less potatoes are now eaten. It is difficult to imagine how any direct appeal on the "eat more bread" lines will improve the situation. Rather, we think, is the solution to the difficulty to be found in devising new ways of using bread in puddings and so forth and in suggesting many forms of sandwiches, spreads, etc., or even in tempting the public with various kinds of "fancy" breads and rolls. Why, for instance, should we not try to encourage the Continental habit of coffee and rolls for breakfast? No, we feel convinced that the way does not lie in a direct attack, but in side-tracks!

Hydrogen Peroxide in Bread

L. H. Bailey and J. A. Le Clerc read an interesting paper at a meeting of the American Association of Cereal Chemists in which the suggestion was put forward of using hydrogen peroxide in place of yeast in breadmaking. Comparative tests were made of breads baked from yeast and from hydrogen peroxide. The most important difference between them was the flat flavour of the peroxide loaf, which is to be expected in view of the fact that the flavour of ordinary bread is largely due to yeast activity. The appearance of the crumb in the two breads was very similar, the peroxide loaf having, however, a better texture. The crust of the peroxide loaf was a little greater and the moisture content somewhat lower than in the case of the yeast loaf. It also contained twice as much water-soluble solids to slightly less soluble starch. The percentages of fat, ash, and total nitrogen in both breads were the same, and the volumes of the loaves were very similar.

Vitamin B in Bread

Miss A. Fay Morgan and Miss H. Frederick have recently carried out some interesting investigations at the Laboratory of Household Science, University of California, to determine the effect of baking on the vitamin B (B_1) content of bread. The general conclusion reached is that practically no loss of the vitamin occurs in whole wheat, rye, and white breads during the baking process. Size of loaf has only slight effect, the $1\frac{1}{2}$ lb. loaves having a slightly higher vitamin B_1 content than the 1 lb. loaves. The crust of the whole wheat bread was found to be definitely lower in the vitamin than the crumb, the maximum lowering being about 35 per cent., as shown by the rat growth method. No doubt this is to be ascribed to the temperature difference.

Wheat Germ

The authors drew attention to the fact that wheat germ has been used to enrich the well-known Hovis bread for some 25 to 35 years, and its inclusion along with that of rice polish in yeast bread and rolls has been advocated for some years by the Bureau of Home Economics of the U.S. Department of Agriculture. Now, in the course of their investigations, Morgan and Frederick have found that the addition of 20 per cent. of wheat germ nearly trebled the vitamin value of the bread, but produced a loaf of somewhat small volume, poor texture, and yellowish colour. Such a loaf is, however, lighter and smoother than most whole wheat breads.

Extra Yeast in Bread

Reference is also made to the suggestions put forward by Krogh, in 1931, and by Eyre, two years later, for the improvement of the vitamin B value of bread by the addition of extra baker's yeast. Dr. Krogh calculated that an increase of the yeast to five times the usual amount would result in the production of a bread which would give in 580 gm. (about 20 oz.) sufficient vitamin B for the needs of the average adult. This suggestion was prompted by a survey of Danish foods which indicated a probable inadequacy of the vitamin in the diet of a large part of the population.

In 1931 Miller suggested the incorporation of rice bran in bread used in Hawaii and reported that about one-fifth of the vitamin B content of the bran was destroyed during baking.

It is also interesting to note that in their recent work Morgan and Frederick found that the addition of raisins, to the extent of 65 per cent. of the flour weight, increased the value of the bread by about 25 per cent., but that the usual 4 per cent. addition of skim-milk did not change the vitamin B_1 content of white bread. Bread sold as "milk bread" was likewise found to be the same as ordinary white bread in this respect.

The Future of Agriculture

Just before Parliament entered into its summer recess a debate took place on the agricultural problems facing the Government, and members of all parties reviewed the past and discussed the future. It was satisfactory to note that on the whole there was a welcome absence of political bias. The debate showed that there is a large measure of agreement by all parties on the outlines of a desirable policy, and there is a general feeling that in the revival of agriculture lies one of the best chances of reducing unemployment. Undoubtedly the present Government have *done* a lot, even though they have achieved less. Obviously a certain amount of experimental work was necessary, and experiments are not always the success that they promise to be. Tariffs, subsidies and quotas appear to be accepted as inevitable now, but the Government's real problem is how to provide a revival in agriculture without bringing about a serious rise in the cost of living. We are essentially a democratic and predominantly industrial community, and a system that involves the principle of a rise in the cost of living would never survive.

Organisation

Undoubtedly there will have to be better organisation in agriculture, as in any other industrial undertaking; overhead charges must be watched, every possible economy effected, buying and selling carefully regulated, and distribution charges reduced to a minimum. Undoubtedly some financial assistance will be necessary. The present trend of policy is to raise the money for subsidies by earmarked levies on imports instead of making direct advances from the Exchequer. In this way it is hoped to keep prices down at the expense of the foreign producer. One thing is certain—our agricultural industry must be maintained, and we wish the Government sound guidance in the framing of future policy.

Ice-Cream

The hot weather has taken our thoughts to ice-cream, and that reminds us of the Ice-Cream Association's victory in the matter of a reduced price for fresh milk used in ice-cream making. At the time the dairymen expressed intense dislike and the Milk Marketing Board was severely criticised.

This now seems to have died down, and we see no reason why ice-cream traders should not receive the same reduction or even more in 1936. Figures show that during the hot spell thousands of gallons of milk and cream have been used daily for ice-cream, and surely both the Milk Marketing Board and the dairy trade must realise the advantages obtained by this use of liquid milk. If cheese factories are entitled to the privilege of special price consideration, then so should the ice-cream makers. More and more ice-cream makers have stopped using skimmed milk powder (mainly of foreign origin) and have taken up home produced fresh milk. More and better ice-cream has been offered to the public this year—ice-cream with real cream in it. The ice-cream manufacturers should be encouraged in this, and we hope that the Milk Marketing Board will vouchsafe a further assistance in the way of price rebate.

Bacteria in Ice-Cream

One cannot help being surprised at the figures given in the Annual Report of the Medical Officer of Health for Liverpool relative to the bacterial content of the local supplies of ice-cream. A large number of samples were examined and as many as ten million bacteria per cubic centimetre were found in some samples, while many samples contained over a million. These are startling figures. The wholesale factories in this country seldom produce ice-cream with more than 200,000 bacteria, and in the United States 50,000 is a common figure and 100,000 a maximum. There must be neglect somewhere among the Liverpool ice-cream makers. If careful attention is paid to the purity of the ingredients and the cleanliness of all machinery and utensils employed, as well as to the purity of the surrounding atmosphere, there is no reason why these high bacterial contents should be obtained. It should be remembered that milk forms an ideal medium for bacterial development, particularly at temperatures between 60° and 145° F., and it is within this range that special care should be taken.

Pasteurised Milk

Once again we return to the much discussed question of pasteurised milk. In a recent paper Dr. Kay, the Director of the National Institute for Dairying at Reading, and F. K. Neave, state that "hitherto no satisfactory method has been available for controlling the efficiency of the process by examination of the product, and as a consequence pasteurisation plants have tended to be assessed more by their appearance and by the claims made for them than by their proven excellence". These workers claim that they have discovered a test to be applied to the pasteurised milk itself without inspection of the plant to determine whether the process has been carried out satisfactorily. The test depends on the fact that phosphatase (an enzyme whose presence and quantity can be detected and determined readily) is completely destroyed by "legal" pasteurisation, but is not destroyed if the milk is heated at a lower temperature than 145° F. or for a shorter period than 30 minutes.

In this connection it is interesting to note the work of M. Schnetka (Z. *Unters. Lebensm*, 1935, vol. 69, p. 235). He has found that it is possible to ascertain beyond doubt whether a milk has been properly pasteurised by a procedure based on the observation that the readily coagulable portion of the lactalbumin in ammoniacal milk is precipitated by ammonium sulphate more readily than in neutral or acid milk to an extent dependent on the temperature and duration of heating. Full details of the method are given in an abstract of the paper in the July number of the *Analyst*.

Some Comments

Kay and Neave have applied their test to milk sold to the public or to school-children as designated "pasteurised" in two London boroughs, five provincial towns, and certain rural districts. As a result of this they feel justified in making certain definite statements that should be well ventilated and given careful attention by local authorities. The first important conclusion is that a large number of pasteurising plants of all sizes both in London and elsewhere are either inherently functionally inefficient or unsatisfactorily operated. Properly designed and supervised plants, whether large or small, provide a satisfactory product. It has been found that of the large firms a majority, but by no means all, use efficient plants and methods. A startling statement is that the milk sold to school-children as "pasteurised" appears, in a large proportion of the cases examined, to have been pasteurised in a particularly amateurish way. Finally, they recommend that, in view of the large percentage of designated "pasteurised" milks on the market which have been grossly underheated, it is particularly desirable that all milk, and especially milk which is to be consumed by school-children, should reach a reasonable hygienic standard—say Grade A—before pasteurisation.

We consider this work to be of vital importance at the present time, and hope it will receive the careful attention of all concerned in the production and distribution of pasteurised milk.

Food Manufacture —
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CEREAL BREAKFAST FOODS

By J. Stewart Remington

THE CEREAL foods occupy a very important place in modern domestic life. In the present state of our civilisation, and the great increase which has taken place in the employment of female labour, the whole outlook of family life has changed, and the young housewife of to-day, who up to the time of her marriage may have been employed in industry or professional duties, in nine cases out of ten, knows very little, if anything, about cooking as so well understood by her mother when she started in a house of her own; hence the enormous increase in the packet-food industry and tinned-goods trades we see to-day.

Porridge

Among these packet products modern breakfast foods largely figure. We are in the age of "ready to serve" and "ready to eat", snack bars and lightning service, an age of rush and hurry. In the writer's early years, apart from wheat flour, the only product was oatmeal. In the country-ground oatmeal of our forefathers much of the husk remained in the ground product, but in modern oat-milling practice much of the fibrous hull is removed, and porridge, as understood by the Scotch and people in the North of England, has long enjoyed a wide use and popularity both at the breakfast table of the rural worker and artisan in the North, as well as at the table of the lord of the manor. However, porridge requires long cooking when made either with water or milk; its keeping qualities are poor, and as originally made it is far from a convenient food to prepare.

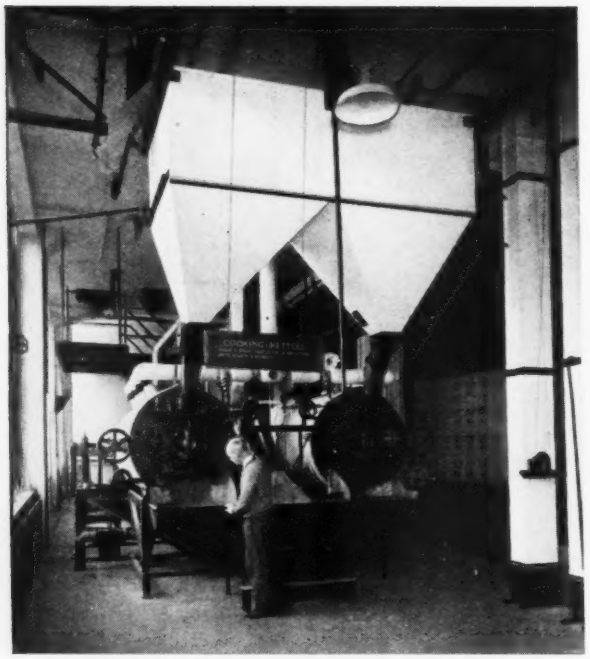
Early Breakfast Foods

Hence, as time advanced, breakfast foods made their appearance. They seem to have originated in the United States. At first the cereals used were wheat flour and corn products such as samp, hominy, and corn meal. The following analyses illustrate these products:

	Wheat Flour.	*Samp.*	*Granulated Hominy.*	*Corn Meal.*
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	13·00	11·60	13·20	12·45
Fat (ether extract) ...	1·00	4·70	1·00	4·20
Proteids	11·80	8·40	8·10	10·01
Carbohydrates ...	73·00	73·85	77·10	70·13
Crude fibre	0·70	0·15	0·20	1·96
Mineral ash	0·50	1·30	0·40	1·25
	100·00	100·00	100·00	100·00

Samp was a product of the early colonial days, and was prepared by a purely mechanical method by which the hull and germ were separated by a process of sifting and cracking, resulting in a product being left—the edible part of the corn. When corn was coarsely ground it appeared on the market as hominy and was frequently boiled.

Modern milling methods have greatly changed the production of corn meal and flour. It is now carefully cleaned and kiln dried to remove moisture, crushed to the necessary fineness, and ground by rolls, and sifted in order to remove the bran. Later, oatmeal was introduced into America, due to the large number of Scotch and



Cooking Kettles used in the manufacture of Shredded Wheat, by the Shredded Wheat Co. Ltd., of Welwyn Garden City, Herts.

Irish immigrants, and later still barley, rye, and rice, and from the various cereals used the great industry of breakfast food manufacture originated.

Cereal Breakfast Foods

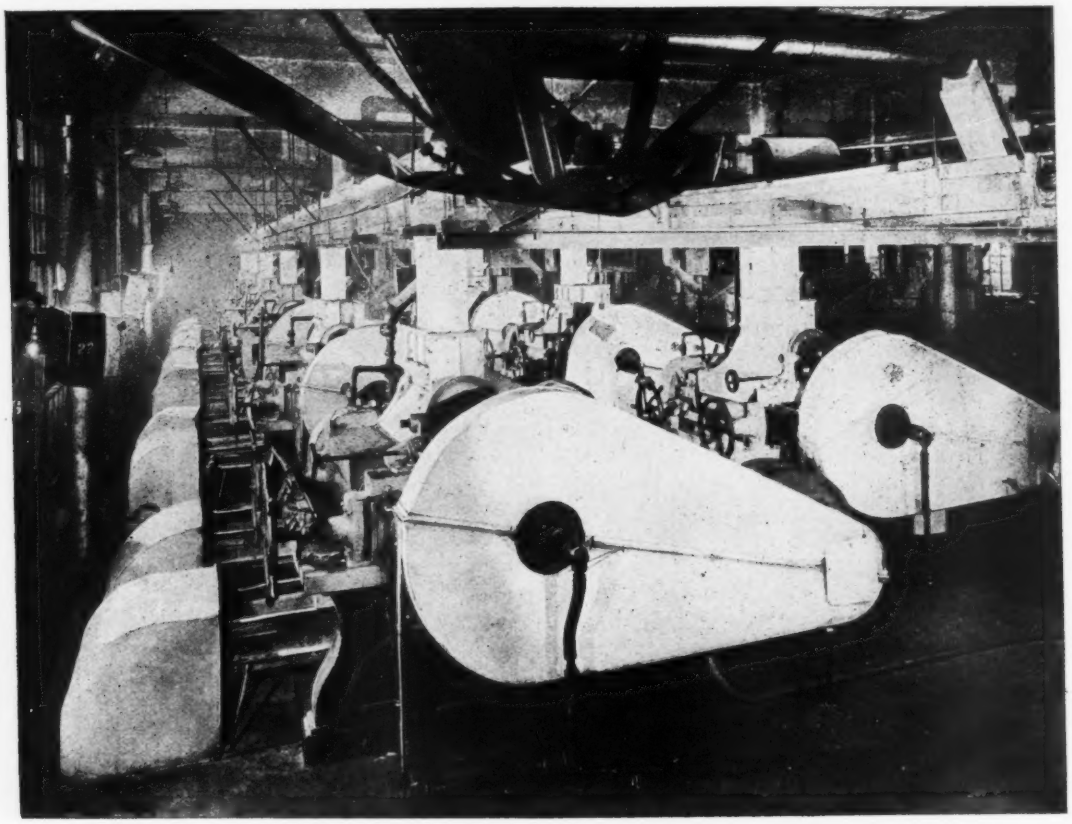
During the latter part of the nineteenth century a great deal of investigation and research was done on the cereals, new methods of manufacture were developed, and many new products were placed on the market under the name of Cereal Breakfast Foods. No class of packet foods has ever enjoyed so extensive a system of advertising as these foods. In a comparatively short time a great variety have made their appearance in America, and the craze for breakfast foods has become firmly established in this country, so that we have several—such as Shredded Wheat, Grape Nuts, Force, and Quaker Oats—in daily use, giving to the cereals an important place in dietary unknown in the past.

Classification

Although there is a long list of such articles to-day, and a much longer one in America, these foods fall into four classes—viz.:

(i) Uncooked whole grain or part of some grain.
(ii) Partly cooked.
(iii) Cooked.
(iv) Malted.

The raw or uncooked foods are those containing unconverted starch; the partly cooked those in which the cell walls of the starch have been more or less ruptured. The cooked foods are those in which more complete gelatinisation of the starch has taken place; and, lastly, the malted foods comprise those in which the starch has been converted into sugar and soluble bodies.



The Kellogg Factory at London, Ontario. Rolling corn flakes.

The Cereals

The cereals used are wheat, oats, barley, corn, and rice. When we consider uncooked foods, the most typical example is oatmeal. In these foods the grain is simply husked and more or less crushed or ground. Under modern milling methods the amount of cellulose left is much smaller than formerly. The oat is characterised by its high protein and fat content. Wheat, rye, and barley are only moderate in fat when compared with oats, but are also high in protein. On the other hand, corn is relatively high in fat, while rice is low in proteins, and in the polished form almost free from fat, fibre, and ash. The examples in Table I. below will illustrate the above points as regards the cereals in meal form.

The mode of preparation and the characteristics of the particular cereal used greatly affect the composition of the breakfast foods produced. In the preparation of certain foods the whole grain is used; in others, more or less of the germ is removed, thus considerably reducing the percentage of fat. In others the cleaned and ground product is carefully bolted to remove nearly all the fibre.

Barley is the least popular grain in the opinion of the writer, and in the States is usually found as pearled barley, in which form it has a low content of fibre and of all ingredients other than the carbohydrates, as the analyses in Table II. show at a glance.

The Manufacture of All-bran in the Kellogg Factory at London, Ontario.

TABLE I.

	Wheat.	*Oats.*	*Barley.*	*Corn.*	*Rice.*
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture ...	11·50	7·85	11·10	12·45	9·10
Fat	3·30	9·53	4·90	5·40	7·30
Proteids ...	13·90	14·38	11·60	10·01	9·63
Carbohydrates	63·50	64·77	64·80	64·84	65·87
Crude fibre ...	4·80	1·57	3·90	3·85	2·70
Mineral ash ...	3·00	1·90	3·70	3·45	5·40
	100·00	100·00	100·00	100·00	100·00

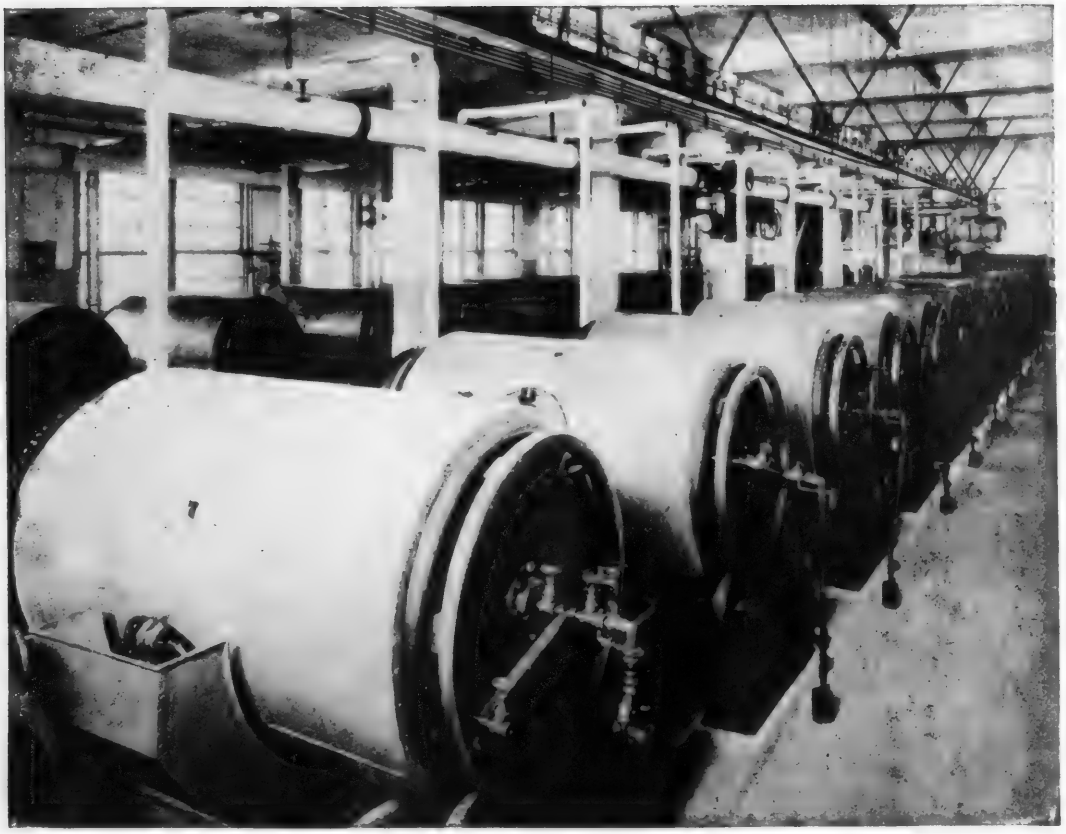
TABLE II.

	Barley.	*Coarse Dust.*	*Fine Dust.*	*Pearl Dust.*	*Pearl Barley.*
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture ...	13·80	14·20	13·10	13·30	14·70
Fat	2·10	1·70	6·00	3·40	1·20
Proteids ...	11·10	7·00	17·60	12·10	7·30
Carbohydrates	65·60	46·80	50·50	67·20	75·20
Crude fibre ...	4·80	24·60	8·50	1·80	0·60
Mineral ash ...	2·60	5·70	4·30	2·20	1·00
	100·00	100·00	100·00	100·00	100·00

The germ of corn is rich in fat, but tends to become rancid on keeping, and is therefore generally removed in the preparation of corn breakfast foods. Partly cooked breakfast foods embrace a large class, over 90 per cent. of the oatmeal consumed in the States being in this form, and "quick oats" are very popular in this country.

Rolled Oats

This form of breakfast food became popular with the introduction of rolled oats. In principle the process consists in cleaning, kiln drying, and hulling, followed by a process of steaming and final flattening between rolls into flakes. When first introduced it was thought that by this process the grain had been so thoroughly cooked that only a few minutes "to serve" would be necessary, but it was soon found out that this treatment had not cooked the grain long enough, and that a certain amount of re-cooking was necessary before serving. What was clearly shown was that a certain amount of moisture had been absorbed in the process, so less water was needed in



Roasting Machines in the Kellogg Factory at London, Ontario.

the final cooking, and, on account of the flaky condition, less time was required than when preparing an uncooked food.

Cooked Foods

What are known to-day as "ready to serve" are cooked products, and are in many cases flaked or rolled cereals, where the process of heating, etc., has been continued a much longer time. These foods may consist of one cereal or a combination of, say, wheat and barley. By the process of toasting, a food of darker colour is produced combined with a characteristic flavour. Among these cooked foods we come across Toasted Wheat Flakes, Puffed Rice, Grape Nuts, and Shredded Wheat.

Shredded Wheat

The manufacture of Shredded Wheat, originally an American product, dates from about 1895, and the process of manufacture was seen by the writer in 1905 when he studied it at Niagara Falls. Australian wheat is usually employed, and special machinery is required, the whole wheat kernel being used. The outline of the process consists in first cleaning the wheat in a most thorough manner, and then it passes through a number of processes, the most important one being the steam-cooking of the wheat, which takes about 35 minutes. The wheat is afterwards dried to remove excessive moisture, and then by special machinery the grain is drawn into shreds, which are piled up in layers, cut into miniature loaves and finally baked.

Grape Nuts

On the other hand, Grape Nuts are prepared from wheat and barley ground together, and made into flour, kneaded into dough, and baked.

A food very similar to Grape Nuts can be made as follows: 100 parts by weight of ground malt are first mashed with 250 parts of water at 140° F. for one hour, then strained, and the residue washed with hot water at 140° F., the liquid being finally made up to 500 parts. To this liquid is then added 160 parts of flour, 30 parts of germ, and 10 parts of thirds. The temperature of the mixture is raised to 140° F., and kept at this temperature for three hours with continual agitation or stirring. The heating is then stopped, and to half the mixture are added 330 parts of flour, sufficient to make it into a dough. It is now rolled out into thin cakes and baked at a temperature of 300° F. until it becomes pale brown and dry. The cakes are next ground up fine and added to the other half of the mixture, to which has been previously added 4 parts of salt. The whole is made into a crumbly mass and baked at 360° F. until light brown and quite crisp. Such a food, which has an appearance very similar to Grape Nuts, can be eaten with cream and furnishes a very nice breakfast food. The analysis is given in Table III. on the next page:

	Table III.	*Per cent.*
Moisture		10·00
Oil		1·00
Proteids		10·50
Carbohydrates		74·00
Crude fibre		2·40
Mineral ash		2·10
		100·00

In this food the carbohydrates consist of maltose 20·18, soluble starch and dextrine 45·00, other carbohydrates 8·82 per cent., total 74·00 per cent.

In the case of Grape Nuts the analysis was as in Table IV.:

	Table IV.	*Per cent.*
Moisture		10·30
Fat		0·60
Proteids		11·50
Carbohydrates		74·20
Crude fibre		1·50
Mineral ash		1·90
		100·00

Another Cooked Cereal

Another food which is quite an excellent cooked product can be made as follows: 100 parts of Australian wheat are heated with twice their weight of water at 175° F. for 30 minutes, then drained and crushed. One hundred parts of fine oatmeal are then thoroughly mixed with twice their weight of water at 167° F., cooled, and the temperature raised to 140° F. Ten parts of ground malt are then added in 30 parts of water, and the mixture kept at a temperature of 140° F. for 15 to 20 minutes. The prepared wheat is now added, and the whole dried at a temperature not exceeding 140° to 158° F. This food gave the analysis shown in Table V.

	Table V.	*Per cent.*
Moisture		5·40
Oil		4·12
Proteids		14·49
Carbohydrates		73·66
Crude fibre		0·63
Mineral ash		1·70
		100·00

Corn Granules

A breakfast food known as whole Corn Granules can be made as follows:

The crushed corn is baked in a moderately high temperature oven, then removed and allowed to cool. The cooked preparation is passed through a chopping machine very similar to a food chopper. The resulting granular mass is then baked a second time. During the process of baking it is well to stir occasionally the product, and when sufficiently browned it is removed from the oven. Yellow corn will brown more readily than white corn, due to the colour of the grain. This food can be served with sugar and cream, and if desired can be moistened first with hot water.

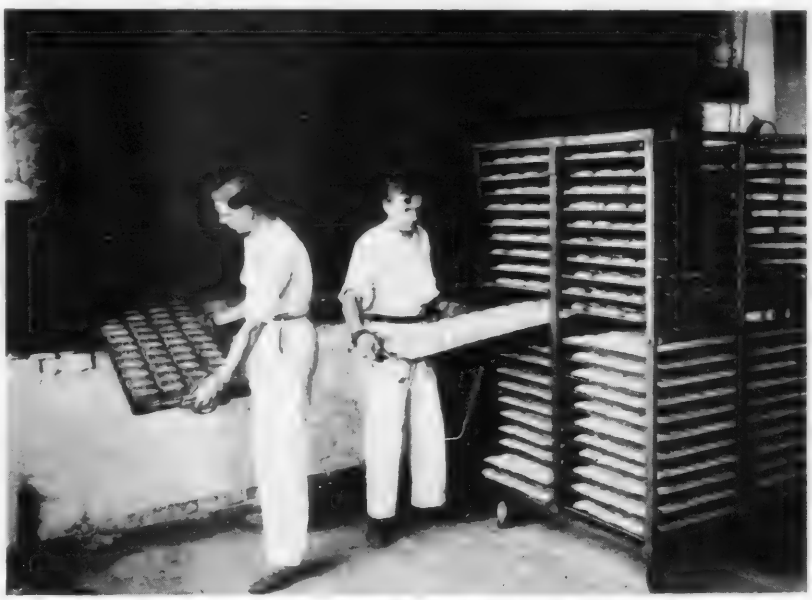
Whole Corn Flakes

In making these flakes the crushed corn free from germ is rolled out into thin sheets before baking. In other respects the procedure is the same as the method previously described. The analysis of the flakes is as follows:

	Table VI.	*Per cent.*
Moisture		11·40
Oil		0·50
Proteids		7·50
Carbohydrates		79·10
Crude fibre		0·20
Mineral ash		1·30
		100·00

Malted Foods

When considering malted preparations, it must be remembered that the cereal grains are all rich in starch, but due to the walls of the starch granules are not very easily digested in the raw state. By slow cooking the granules are ruptured and the starch made soluble. In order to make the food more easily assimilated, and as a further aid to digestion, the cereal starch is subjected to the action of malt, but in most cases the amount of malt added is not sufficient to convert more than a part of the starch into a soluble form. In many of these malted foods the soluble carbohydrates exist largely in the form of dextrin, which can also be produced by heat only.



Taken in the Factory of the Shredded Wheat Co. Ltd. at Welwyn Garden City, Herts. Shredded Wheat being removed from the oven after baking.

Predigested Foods

In the past much has been written as regards the great advantage to be gained by using predigested foods, as by so doing the digestive tract is relieved of much of its normal work. Whether it is wise habitually to take artificially digested foods is still an open question which crops up from time to time, for under normal conditions the human body can quite well perform the process of digestion itself, and the digestive organs are all the better in the case of healthy persons by having to do a certain amount of exercise to keep them in a satisfactory condition.

Composition of Breakfast Foods

The following are various types of breakfast foods analysed by the writer, the results being given in percentages in Table VII. below:

TABLE VII.

Wheat Products.

	A.	*B.*	*C.*	*D.*	*E.*
Moisture ...	13·24	10·74	10·30	11·52	8·32
Oil	0·92	1·20	0·65	1·84	1·43
Proteids ...	11·61	10·65	11·53	13·07	11·21
Carbohydrates	73·42	73·74	73·27	70·13	78·38
Crude fibre ...	0·21	1·04	0·51	1·60	0·14
Mineral ash ...	0·60	2·63	3·74	1·84	0·52
	100·00	100·00	100·00	100·00	100·00

Oat Products.

	A.	*B.*	*C.*	*D.*	*E.*
Moisture ...	11·45	10·52	10·84	10·13	10·84
Oil	5·64	9·10	6·13	9·64	5·85
Proteids ...	15·62	15·14	15·91	13·32	16·52
Carbohydrates	64·49	63·10	64·30	64·73	63·93
Crude fibre ...	1·00	0·32	0·92	0·45	0·91
Mineral ash ...	1·80	1·82	1·90	1·73	1·95
	100·00	100·00	100·00	100·00	100·00

Corn Products (American).

	A.	*B.*	*C.*	*D.*
Moisture	11·72	11·74	12·34	11·35
Oil	0·41	0·36	0·82	2·93
Proteids	9·85	6·41	7·52	9·14
Carbohydrates ...	77·20	78·55	78·58	75·01
Crude fibre	0·50	0·23	0·21	0·42
Mineral ash	0·32	2·71	0·53	1·15
	100·00	100·00	100·00	100·00

Rice Products (American).

	A.	*B.*	*C.*	*D.*
Moisture	12·58	11·35	12·24	12·26
Oil	0·13	0·32	0·23	0·21
Proteids	7·84	7·24	6·98	7·63
Carbohydrates ...	78·84	80·56	79·99	79·35
Crude fibre	0·21	0·22	0·14	0·13
Mineral ash	0·40	0·31	0·42	0·42
	100·00	100·00	100·00	100·00

Oat Products

With regard to the various breakfast foods, those which require further cooking, but at the same time exhibit a superiority from the nutritive standpoint, are the oat products. They are the only foods which contain any considerable percentage of fat, and on account of this fact people are apt to look upon oat foods, whether as oatmeal, rolled oats, flaked oats, or groats, as heating and unsuitable, especially in hot weather. A good deal, however, depends on the mode of life of the individual. No doubt in the case of the city worker, whose life is spent in an office, who employs tube or bus daily to get to business, and therefore gets little exercise, the regular use of oat products may not be desirable, especially if the individual is subject to some form of skin trouble in the spring and hot weather. On the other hand, if one lives in the country, or is staying on the moors, and is out all day, oat products—to start the day—will be found very sustaining, especially if much walking and hill climbing is indulged in. From American experiments it has been shown that a quarter of a pound of oatmeal yields approximately 430 calories, while the more commonly used breakfast foods yield about 400 calories.

Digestibility

With regard to the "ready to eat" preparations, the composition and solubility of the carbohydrates vary. In some cases only 10 per cent. of the carbohydrates are water soluble, while in some flaked products, such as flaked wheat, 15 per cent. is soluble; flaked corn, 26 per cent.; puffed wheat, 27 per cent.; and in Grape Nuts, 35 to 36 per cent. of water-soluble carbohydrates are present. Further, the value of any food depends not only upon the amount of nutrients it contains, but on its digestibility. Partly cooked wheat products seem to have the highest digestibility.

From various investigations, which from time to time have been undertaken during recent years, the general conclusions seem to be that wheat products show the highest digestibility and corn products the lowest. Oat products provide the largest amount of digestible protein and fat, followed by wheat, then barley; while corn and rice, though supplying relatively large amounts of carbohydrates, are much inferior as regards supplying fat and protein. In many preparations subjected to processes which have converted a part of the starch into soluble carbohydrates, this has been achieved at the expense of the diminished digestibility of the protein; therefore it would appear that raw cereals, if sufficiently cooked, are more digestible all round than many of the malted products and are more suitable for daily use at the breakfast table.

Citric Acid Action on Antimony Compounds

IT has been shown that antimony compounds are extracted from "hard" enamels by the action of dilute citric acid solutions. Cleaning and scouring enamel vessels exposes a new surface to the action of the citric acid, with consequent increase in the antimony extracted. Storage of citric acid solutions in enamelled vessels is dangerous, owing to the rapid increase in the antimony content of the stored solution. A slightly modified method for determining antimony in such solutions has been described. (From a paper entitled "Antimony compounds extracted from enamel-ware by citric acid solutions" read by R. H. Burns, B.Sc., A.I.C., before a meeting of the Society of Public Analysts.)

DESSERT BISCUITS

by
JOHN PARKER
(National Bakery School, London)

DESSERT BISCUITS, in the accepted sense of the word, are of the more expensive variety of biscuits, and in consequence are not to be found in every confectioner's window. These biscuits must be made of the best materials, and many of them need to be made and finished off by hand. Confectioners in the right districts would do well to make a display of such biscuits occasionally; their customers and others would see and appreciate them.

The following recipes are some which should prove good selling "lines" and do not entail too much time in the making.

Wine Biscuits.

Soft flour	4 lb.
Castor sugar	2 ,,
Butter	2 ,,
Eggs	7

Oven temperature, 410° F.

Rub butter into flour very finely. Make a bay, place in the sugar and eggs, and mix well together. Draw in the flour and butter; then mix carefully to a smooth paste. Do not over-handle. From this paste a variety of biscuits can be made. For instance, wine biscuits are usually cut out with the help of small, plain, differently shaped cutters, and some are decorated with glacé cherries and small diamonds of angelica. Others can be cut out by means of small, round, plain or fluted cutters, washed over with white of egg and dipped in desiccated coconut or a mixture of equal parts of almond and sugar nibs. Some can be dipped in castor sugar and a small bulb of raspberry or strawberry jam piped in the middle on top before baking.

Different flavourings such as vanilla, kirsch, and the rind and juice of oranges can also be added to make a greater variety.

Dutch Macaroons (Cold).

Superfine granular sugar	2 lb.
Ground almonds	10 oz.
Whites	10-11
Essence of vanilla.	

Place the almonds and sugar in a clean bowl; add whites and well beat. Then, with a plain ¼-in. tube, pipe out oval shapes about 1¼ in. long on to papered trays. Allow to stand in a warm room until next day. Then, with a sharp-pointed knife, cut through the top skin down the middle and bake to a pale golden colour in an oven of 350° F. When cold, damp the papers and stick together in pairs with thin apricot purée.

Queen Drops.

Butter	1 lb.
Castor sugar	1 ,,
Soft flour	1¼ ,,
Eggs	8

Make on the sugar batter process, and, with a plain ¼-in. tube, pipe boldly on to papered trays not more than ¾ in. diameter. Decorate some with neat rounds of glacé cherries and others with small diamonds of angelica. Bake in an oven of 440° F. to a pale golden colour. When cold, these biscuits can be taken off the paper quite easily.

Chocolate Macaroons.

Granular sugar	2 lb.
Ground almonds	1 ,,
Ground rice	2 oz.
Powdered cocoa	6 ,,
Whites	10-11
Essence of vanilla.	

Mix the dry ingredients together; then add the whites and beat well. Pipe on to papered trays, using a ½-in. plain savoy tube, making the round macaroons 1 in. diameter and the fingers 1½ in. long. Bake in an oven of 350° F. When cold remove papers and dip half of each biscuit into melted chocolate couverture and allow to set.

Raspberry Biscuits.

Ground almonds	1 lb.
Castor sugar	1 ,,
Sponge cake crumbs	1 ,,
Yolks	8
A little raspberry flavour.	
A little pink colour.	

Place the dry ingredients on a table and mix thoroughly together. Make a bay; put in eggs, colour, and flavouring and mix to a firm smooth paste.

Pin out into lengths of ⅛ in. thickness and not more than 3 in. wide. Sandwich two strips together with raspberry jam. Then coat the surface with pink royal icing with a little flour added to it.

Cut into fingers ¾ in. wide. Place on wafer papered trays and allow to stand until next day. Then bake in an oven of 350° F.

Orange Macaroons.

Ground almonds	1 lb.
Fine castor sugar	1½ ,,
Ground rice	1 oz.
Whites	8
Orange flower water	½ oz.

Place dry ingredients in a clean bowl. Add whites and orange flower water and beat well. Pipe out on to papered trays about ¾ in. diameter and hollow the centre with a damp wooden skewer. Dredge with granulated sugar and bake in an oven of 350° F. When cold, take off papers and decorate the centre of each with orange coloured and flavoured fondant and neat diamond or round shapes of candied orange peel.

These are but a few of the many kinds of dessert biscuits. If good materials are used and careful attention is given to detail and finish, the results will be very pleasing in every respect.

Liquid Leavening Media

By Simon Mendelsohn
of Cincinnati, Ohio, U.S.A.

LIQUID LEAVENING aids possess, generally speaking, only a historical interest, having long ago become almost completely superseded by the commercial types of baking powders. The latter, despite their proprietary variations, are usually preferred, primarily for the facilities afforded by their use, the uniformity of their composition, and the constancy of results attainable through a more adequate control.

Sour Milk

Certain leavening media in liquid form are, however, still being used in domestic baking, particularly in rural districts. The best example is sour milk, employed in conjunction with soda, to promote reaction between the lactic acid and the alkali:

$$\underset{\text{Lactic acid.}}{C_3H_6O_3} + \underset{\text{Soda.}}{NaHCO_3} \longrightarrow \underset{\text{Sodium lactate.}}{NaC_3H_5O_3} + \underset{\text{Water.}}{H_2O} + \underset{\text{Carbon dioxide.}}{CO_2}.$$

The formation of lactic acid in the course of the souring of milk is due to specific types of bacteria[1] which tend, essentially, to hydrolise lactose (milk sugar)[2] to lactic acid:

$$\underset{\text{Lactose.}}{C_{12}H_{22}O_{11}.H_2O} + \text{Bacteria} \longrightarrow \underset{\text{Galactose.}}{C_6H_{12}O_6} + 2\underset{\text{Lactic acid.}}{C_3H_6O_3}.$$

Van Slyke[3] ascertained the lactose content of 100·0 c.c. of fresh milk to amount to 5·75 gm., which, after souring of the milk over a period of sixty hours, was reduced to 4·48 gm., accompanied by 1·124 gm. of lactic acid.

Souring becomes evident to taste when the lactic acid content approaches 0·4 per cent.;[4] as the acidity increases to about 0·76 per cent., the lactic acid tends to react appreciably with the calcium casein to yield calcium lactate, and the casein is precipitated as curd.[5] Bacterial activity is considerable in fresh milk at ordinary temperatures, but is diminished concurrently with the increase of acidity up to 0·7 per cent. of lactic acid,[6] the formation of which may, however, proceed continuously up to 1·6 per cent. by weight.[7]

Acidity of sour milk, as ordinarily employed for culinary purposes, does not as a rule exceed 0·4 to 0·5 per cent[8] of lactic acid. The use of sour milk and soda for leavening is open to serious objections arising through uncertainty of results if the free lactic acid is not available in the proportion required to effect complete neutralisation of the alkali. Fresh buttermilk, usually containing 0·6 per cent. of free lactic acid, is employed in combination with soda in a variety of pastry formulæ. A modernised version of an old principle is embodied in the use of powdered, dried buttermilk introduced directly into a baking powder. This serves for the total or partial replacement of certain other acid media ordinarily used in commercial leavening preparations. This combination was superficially devised to simulate the early process of aeration with liquid buttermilk and soda, and simultaneously to impart the nutriment of the milk solids to baked goods.[9]

COMPOSITION OF DRIED BUTTERMILK SOLIDS COMPARED WITH LIQUID BUTTERMILK.

	Samples.			
	(1).	(2).	(3).	*Liquid.*
Butterfat	1·00	10·70	5·50	1·17
Protein	37·10	35·24	35·50	3·00
Lactose	48·40	35·50	40·00	2·75
Ash	7·90	8·24	8·00	0·85
Free lactic acid ..	2·60	6·00	4·00	0·60
Moisture	3·00	4·32	7·00	91·63
	100·00	100·00	100·00	100·00

Syrup

Daniels and Heisig[10] investigated the acidity of the various syrups employed as adjuncts in baking certain types of pastries on the basis of their reactivity with soda. Cooking molasses and sorghums vary in acidity;

[1] *B. aerogenes* (lactis acidi), *B. streptococcus lactis*, *B. bulgaricus*, etc.
[2] As milk sours, smaller amounts of acids, other than lactic, are also formed—*e.g.*, formic, acetic, propionic, butyric, and some of their derivatives.
[3] *J. Biol. Chem.*, 24, 191 (1916).
[4] *Hygienic Lab. Bul.*, 56, 328 (1909).
[5] *Ibid.*
[6] *J. Biol. Chem.*, 24, 191 (1916).
[7] *Hygienic Lab. Bul.*, 56, 361 (1909).
[8] Van Slyke, L. L., "Chem. of Sour Milk," *N.Y. Agric. Exp. Sta. Tech. Bul.*, 140 (1928).
[9] U.S. Patents 730,888 (1903); 1,230,452 (1917).
[10] *J. Home Economics*, 11, 193 (1919).

the acid content of honey is lower than that of either of these syrups, but considerably greater than that of corn-syrup. It is worthy of note that the acidity of honey is due to formic acid that is accumulated in the course of passing through the bee.

These media are invariably employed solely for their flavour, which in turn is imparted to certain types of pastries, rather than for their variable acid content. Molasses is the syrup most commonly used in a variety of formulæ, and is now available in dry form. Bailey[11] mentions the use of vinegar as a means of supplementing the acidity of molasses in its reaction with soda. In view of the low acidity of molasses, there would in this case be a predominance of the acetic acid of the vinegar, thus resulting in the formation of sodium acetate:

$$NaHCO_3 + HC_2H_3O_2 \longrightarrow NaC_2H_3O_2 + CO_2 + H_2O.$$

As sodium acetate is efflorescent, the excess moisture absorbed might tend to maintain greater freshness of baked goods, which may, however, be characterised by a bitter taste occasioned by this salt. The excess of moisture may in this manner be conducive to mould formation, despite otherwise clean environment. In the preparation of certain varieties of white layer cakes, excellent results may, however, be obtained with vinegar (45 gr.) and soda, $1\frac{1}{4}$ and $\frac{1}{4}$ oz. respectively, as the leavening media. The results in this case are comparable to the use of 1 oz. of a baking powder yielding the requisite volume of leavening gas.

The acidity of invert (sugar) syrup generally exceeds that of honey, which consists essentially of this saccharine principle to the extent of 75 per cent. Use of invert sugar syrup is adapted to the replacement of sucrose (cane sugar) and, at the same time, to contribute characteristic moisture retention properties; its reaction with soda is inadequate to provide any appreciable degree of aeration.

Alcoholic Liquors

Bailey[12] has also cited the possible use of brandy, wine, or any liquor properly diluted, instead of water in mixing doughs, the subsequent expansion and aeration of the mass depending upon the volatility of the alcohol in these media. The expense and flavour imparted to baked goods are the important deterrents mentioned by that writer.

Eggs

The utilisation of whole fresh eggs as an aerating expedient was early recognised, since, in place of yeast and prior to the advent of chemical leavening agents, the success of old baking recipes frequently depended upon "18 eggs beaten with a rod for 30 minutes".[13] Egg whites, at best, possess only a limited value for aerating purposes, the action being purely mechanical in character. Whisking or beating the eggs (or the whites) gives rise to an aggregation of minute air cells enmeshed within a froth of a density depending upon the degree of turbulence exerted in modifying the physical structure of the proteins and other substances of the egg. Whole eggs are capable of aerating their own weight of flour,[14, 15] so that the use of a quantity of the latter exceeding that of the eggs must necessitate the inclusion of an accessory agent to leaven the surplus material. It is readily apparent that the cost of using fresh eggs or egg whites alone in quantities sufficient to afford satisfactory leavening results comparable to those obtained with the usual aerating media would prove prohibitive for most practical or commercial purposes.

A few eggs, however, when employed judiciously really serve as an advantageous and economical expedient in connection with the creaming process ordinarily a preliminary to the preparation of cake batters. Creaming designates the thorough admixture of eggs with sugar and shortening by vigorous and rapid stirring or beating, whereby a maximum volume of air is incorporated into the mixture. The creamed ingredients, while in many instances forming a somewhat plastic mass, nevertheless merit legitimate inclusion in the category of liquid leavening media. In addition to "lightness" imparted to cakes through the initial creaming process, a definite increase of volume is obtained, with the simultaneous enhancement of grain and texture. These properties are manifestly due to the preferably uniform distribution of very fine air-globules throughout the mix. Since air increases only $\frac{1}{490}$ part of its volume at 32° F. for every 1° F. elevation of temperature, the expansion of the incorporated air contributes toward aeration and "lightness" only to a limited degree. Ultimate success in practical baking therefore necessitates the intervention of leavening agents to maintain the porous structure to the highest degree.

Mineral Acids

Free hydrochloric acid was one of the earliest acids employed in conjunction with soda for the liberation of carbon dioxide for leavening purposes. A patent claiming the invention was issued in 1836 to Whiting, although Hart[16] attributes to Liebig the suggestion of using this acid with soda as an aerating combination:

$$HCl + NaHCO_3 \longrightarrow \underset{\text{Common salt.}}{NaCl} + CO_2 + H_2O.$$

This procedure, formerly used chiefly in English baking practice, has long ago become obsolete in view of the availability of more reliable and convenient preparations

[11] *Sanitary and Applied Chemistry*, N.Y. (1906).
[12] *Ibid.*
[13] Allen, I. B., *Modern Cook Book*, p. 224, N.Y. (1924).
[14] Bennion and Stewart, *Cake Making*, London (1930).
[15] See "Beating Properties of Egg White," by Henry, W. C., and Barbour, A. D., *Journ. Ind. and Eng. Chem.*, September, 1933, p. 1054; also *Bakery Research Bul.*, No. 6, Procter and Gamble Co., Cincinnati, Ohio, U.S.A. (1930).
[16] *Leavening Agents* (1914).

in ready-mixed form. Hassall[17] quotes the use of hydrochloric acid in combination with soda "to make white or flour bread" resulting in a 3-lb. loaf:

Flour, dressed or household	3 lb. (av.)
Soda, in powder	9 drm. (apoth. wt.)
Hydrochloric (muriatic) acid	11¼ fl. drm.
Water .. .. about	25 fl. oz.

Hydrochloric acid incorporated with dried casein, forming a dry powder to be mixed with soda, constituted a baking powder devised by Teller in 1904.[18] It is of interest to note, however, that the use of this acid was revived in Europe during the World War, the preparation consisting of potato starch impregnated with the acid and incorporated with soda. This mixture is cited[19] to have been employed in the usual manner with moderately satisfactory results, but prolonged storage ultimately proves conducive to deterioration, coincident with hydrolytic conversion of the starch "filler" to glucose.

A leavening mixture containing casein impregnated with phosphoric acid (ortho) in admixture with soda and a filler was suggested in 1902,[20] but records of further development or use of this innovation are not available.

Carbon Dioxide

The Dauglish patent introduced in England in 1856 involved the use of carbonated water as the aerating medium. Flour was mixed with water charged with carbon dioxide under pressures varying from 40 to 200 lb., and the subsequent release of the dough into pans and exposure to oven heat expanded the gas in solution throughout the mass, resulting in rising of the dough.

The original Dauglish patent was eventually superseded by a process wherein the dough itself was charged by the introduction of carbon dioxide under pressure. While economic advantages would doubtlessly accrue through the absence of fermentation losses, the bread prepared by these processes is characterised by a raw flavour due to the unfermented gluten. Hassall[21] claimed that the consumer soon tired of the taste of bread made by the so-called "aeration" process. As far as known, this method has long ago been abandoned.

[17] *Food, its Adulterations and the Methods for Their Detection*, London (1876).
[18] U.S. Patent 749,643.
[19] Bennion and Stewart, *Cake Making*, London (1930).
[20] U.S. Patents 692,451, 692,452, and 692,453.
[21] *Food, its Adulterations and the Methods for Their Detection*, London (1876).

PASTEURISED MILK

In the Editor's Comments of the June issue we quoted a letter from Mr. Fearis (who, by the way, was formerly Bacteriologist to the City of Cardiff and County of Glamorgan Public Health Laboratory), in which he stated that pasteurisation destroyed the lactic acid bacteria—*Streptococcus lacticus* (*sic*). This has called from one of our readers—a well-known expert on milk and pasteurisation problems—some rather caustic comments. He points out that the characteristic lactic acid bacterium of milk is not *Streptococcus lacticus* but *Streptococcus lactis*, and goes on to state that all who handle pasteurised milk commercially know that it sours in a normal manner, due to the growth of this organism.

He also quotes the work of Ayres and Johnson published in Bulletin 126 of the Bureau of Animal Industry of the U.S. Department of Agriculture, which led to the conclusion that commercially pasteurised milk always sours because of the development of lactic acid bacteria, which, on account of their high thermal death point, survive pasteurisation—or in some cases because of subsequent contamination with acid-forming bacteria during cooling and bottling.

Experts Disagree

There is evidently some confusion on the subject when experts disagree; it is obvious that all is not known about pasteurisation or there would not be the amount of investigation that is now taking place. We quoted Mr. Fearis' letter to the *Lancet* merely to ventilate the subject, which admittedly is one of great importance. We hoped it would stimulate interest and draw comments from our readers, and are glad to have received those to which we have just referred. We make no claim for the correctness or otherwise of Mr. Fearis' statements, and would like to receive and will gladly print any other opinions our readers may wish to bring forward.

Milk Problems

To these observations which we have submitted to our reader who expressed his scepticism of Mr. Fearis' contentions, he replies as follows:

"Where living organisms are concerned the unexpected may happen, but the work of Ayres and Johnson does appear definitely to settle what the normal sequence of bacteriological events is in milk pasteurised by the standard holder process—viz., 143° to 145° F. for thirty minutes (143° F. in America, 145° F. in England).

"If these limits are exceeded, then the argument does not of necessity hold. Unfortunately, the scientific attitude towards milk problems is far too often warped by political considerations. Therefore, in order that the reader may himself form a sound judgment, it is important that writers of letters to the Press should give either details of the experiments on which a statement is based or reference to the original source of information."

CEREAL CHEMISTRY *in* CANADA

The following is a continuation of Dr. H. B. Cronshaw's articles on the Training of the Food Technologist, and gives an account of the facilitiesw hich exist in Canada for the study of milling and baking problems.

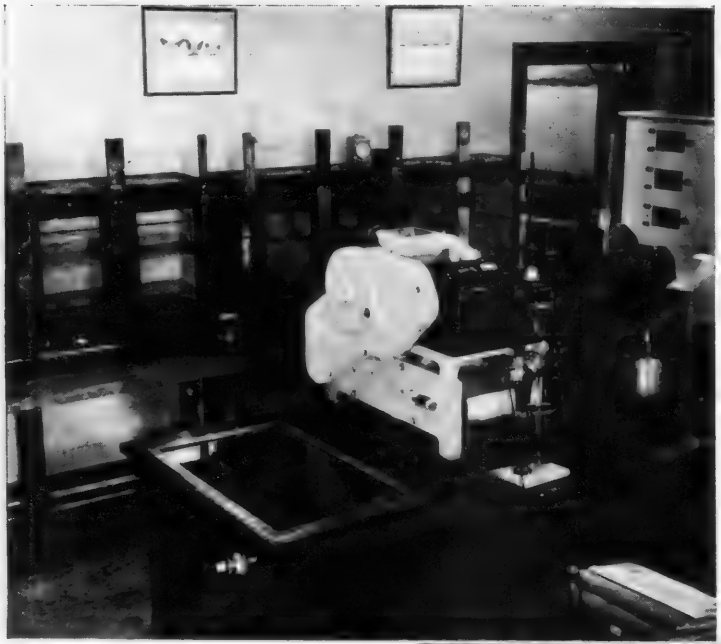
IN CANADA the organisation of cereal research and of experimental milling and baking has been brought to a high state of perfection. This work is centred round the Dominion Grain Research Laboratory, which was established in Winnipeg in 1913 with Dr. F. J. Birchard as Chemist in Charge, followed by W. F. Geddes in 1933. The establishment of this laboratory was an outcome of the passing of the Canada Grain Act in 1912, administered by a Board of Grain Commissioners, and this Act consolidated control of the transportation, inspection, and warehousing of grain under the Federal Department of Trade and Commerce. The Board soon encountered problems relating to the proper grading of grain, which required scientific study and research, and hence arose the idea of the Laboratory. Some of the problems which demanded immediate attention were the safe moisture limits for the transport and storage of the different cereal grains; the effect of various kinds of damage on the milling and baking quality of wheat; the proper conditions for artificially drying tough and damp wheat without damage to quality; the protein content as a factor in wheat grading; the effect of the combined harvester on wheat quality; methods for testing dough resistance, and many other problems of urgent national importance. The results of such work have been successfully applied in the Canadian grain grading system, which was thus placed on a firm scientific basis.

The Dominion Grain Research Laboratory, Winnipeg. A section of the mill room, showing the experimental mill used for the milling of macaroni wheats.

There are, of course, other institutions and University departments in the Dominion which concern themselves to varying extents with cereal work, and in 1926 the Associate Committee on Grain Research of the National Research Council was set up to co-ordinate all such activities of Government supported institutions in Canada. Until recently, the University of Manitoba, with which Mr. Geddes was formerly associated, was represented on the Associate Committee on Grain Research, and was one of the laboratories collaborating in carrying out the experimental work in connection with various projects outlined by the Committee. However, upon Mr. Geddes' resignation from the staff, a cereal chemist was not appointed to fill the vacancy, and, as a result, the University of Manitoba is now not represented, the Dominion Grain Research Laboratory taking its place in the co-operative work. Since the University of Manitoba no longer maintains a cereal laboratory arrangements have made whereby graduate students majoring in cereal chemistry may do their research work in the Dominion Grain Research Laboratory, which for this purpose is an associate body of the University. A similar arrangement exists in connection with the University of Minnesota for students who have completed their course work and for some particular reason may desire to undertake their research in the Dominion Laboratory rather than in Dr. Bailey's own laboratory. Occasionally students come from abroad for a few months' work, as, for example, from Australia. This arrangement has been found to be of value to the laboratory as well as to the student, since a more or less fundamental research problem can be assigned to the student, which through the pressure of routine work cannot conveniently be taken up by the staff. Apart from its routine duties, the Dominion Laboratory co-operates with the University of Alberta and Saskatchewan and the cereal department of the new National Research Council Laboratories at Ottawa, which are devoted to fundamental research. Reference should also be made to the Trent Institution, established at the Ontario Agricultural College in 1927 by the Bread and Cake Bakers' Association of Canada, assisted by the allied trades.

The Dominion Laboratory

The work of the Dominion Grain Research Laboratory was well described by Mr. Geddes at last year's Convention of the American Association of Cereal Chemists, held at Toronto. The Laboratory now occupies approximately 6,000 sq. ft. of floor space, comprising a sample-receiv-



Above: The Dominion Grain Research Laboratory, Winnipeg. A section of the experimental baking laboratory, showing dough mixers, moulder and fermentation cabinets.

ing and moisture-testing room, experimental mill room, baking laboratory, macaroni laboratory, optical laboratory, balance room, nitrogen testing laboratory, two general chemical laboratories and workshop, in addition to offices, storage rooms and a constant condition room measuring 12 by 16 ft., provided with temperature and humidity control.

The mill room is equipped with grain-cleaning apparatus, and contains two Allis-Chalmers experimental units—a four-stand mill for use in milling flour from bread wheats and a three-stand mill provided with especially cut corrugated rolls for the experimental production of semolina from Durum wheat. An experimental purifier, Bahnson humidifier, and necessary equipment for Pekar slick tests, complete the mill room equipment.

Baking Laboratory

The experimental baking laboratory is provided with two complete sets of equipment, one for the standard commercial type of loaf and the other for baking 100 gm. doughs. The "large loaf equipment" comprises two Hobart mixers, two Despatch polished steel cabinets for fermentation and proofing, the latter equipped with a Bahnson type C humidifier with an automatic proofing device so arranged that individual bell signals operate when the dough has proofed to a given height. A Thomson one-man moulder is used for moulding the large loaves, which are baked in a Despatch oven to which a steam generator is connected. The "pup loaf" equipment comprises a Hobart and a Hobart-Swanson mixer, a special fermentation and proofing cabinet equipped with manually operated rotating plates, "S rolls" and a baking oven equipped with a rotating shelf and a muffle furnace type of door. Volume measuring apparatus for large and small loaves, a bread cabinet and an electric refrigerator are also installed.

Durum Laboratory

The Durum laboratory contains an experimental macaroni unit, comprising mixer, kneader and press assembled on a heavy table, a preliminary drying cabinet, and a curing cabinet which provides for the drying of the macaroni under controlled conditions of temperature, air velocity and humidity gradient.

Below: A section of the baking laboratory, showing fermentation cabinet and ovens at the Dominion Grain Research Laboratory, Winnipeg.

The optical laboratory contains a Bausch and Lomb Universal spectrophotometer, a Hilger polarimeter, a Bausch and Lomb colorimeter and complete photographic and microscopic equipment.

The nitrogen room is equipped with a 98 unit digester and a 48 unit distillation apparatus and the necessary equipment for titration and automatic dispensing of acid and alkali.

In the chemical laboratories are two vacuum ovens, two air ovens, muffle furnaces, apparatus for the electrometric determination of hydrogen-ion concentration, fat extraction apparatus, a viscosimeter, an especially designed refractometer for flax quality studies, constant temperature baths, etc.

The sample receiving room contains grain-cleaning equipment, and Robart and Wiley grinders.

Moisture Testing

Probably the most important regulatory duty of the laboratory is the supervision of moisture testing conducted at the various Canadian inspection points. The variables influencing moisture results by the Brown-Duvel method were early made the subject of extensive study. All moisture testing equipment is purchased through the laboratory and checked for accuracy before being released to the inspection offices. Check test samples are sent out fortnightly by the laboratory and the results of the various operators compared with those obtained by an experienced operator on the laboratory equipment and with the results of oven determinations. Any irregularities are thus quickly ascertained and corrected. The testers are inspected by a representative of the laboratory at least once a year.

Another important regulatory duty is the testing of all artificially dried wheats. The quality of the dried wheat is compared with that of a sample of the same lot before drying to determine whether injury has taken place as a result of the drying process.

Wheat Grading

The chief chemist is an ex-officio member of the Western Grain Standards Board, which is responsible for setting up the standards used by the inspectors as references in grading. The laboratory, by conducting tests on samples of new crop wheat, collaborates with the Chief Inspector in preparing tentative standards for the Grain Standards Board. When the standards are set, their characteristics are determined and published in the leading grain journals of the world for the information of millers. In the actual grading of the wheat, portions of each sample are retained and composited according to grade. These average samples, from the various inspection points, are tested at frequent intervals, to assist in maintaining uniformity in grading.

The protein content of every cargo shipment leaving the country is determined, and milling and baking tests are run on occasional cargoes, selected at random.

Protein Survey

Since 1927, an annual survey of the protein content of the top four grades of wheat has been conducted. Samples are drawn from approximately 2,000 points throughout Western Canada, involving protein and moisture tests on from ten to twelve thousand samples. The results are published as early in the crop year as possible, in the form of a coloured map showing regions where grain of high and low protein content is grown.

Extensive tests have been undertaken to determine the value of Canadian wheat for blending with the soft weak wheats of Europe. The laboratory has also been of considerable assistance to Canadian Trade Commissioners in foreign countries by conducting specific tests on competing commercial flour brands, using formulæ and baking procedures designed to duplicate as closely as possible the commercial baking practice in the particular country. As a result of such tests, it is frequently possible to recommend alterations in baking practice which will give improved results.

Co-operative Research

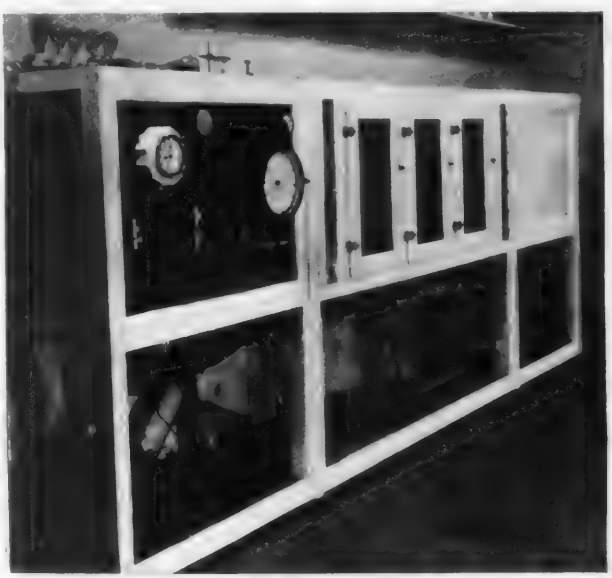
The Laboratory, in co-operation with the University of Alberta and Saskatchewan, and the Cereal Division, Ottawa, recently carried out a series of tests on 32 new rust-resistant wheat varieties, grown at a number of points in the three prairie provinces. Data were secured on relative yield, earliness, strength of straw and resistance to rust, foot-rot and other diseases. The harvested wheats were submitted to the Grain Research Committee, which outlined the tests to be conducted by the various collaborating laboratories.

The system of dividing all samples into three or four parts and checking milling and baking results independently, using methods which are carefully standardised by frequent consultation and comparison, has been found especially valuable in technological work of this nature, where the conclusions reached may mean millions of dollars to the wheat producers and the grain trade.

The laboratory has recently co-operated with the National Research Council in conducting an extensive investigation of methods for determining moisture in cereal grains, involving a comparison of the results given by five electrical moisture meters, the Brown-Duvel, 130° C. air oven and official vacuum oven methods.

Durum Wheat and Macaroni

The recent installation of experimental durum milling and macaroni-making equipment and a spectrophotometer will permit quality studies on durum wheat, the production of which has greatly increased during the past ten years, particularly in southern Manitoba and south-eastern Saskatchewan. Experimental technique is now being developed, and studies on factors affecting durum wheat quality, including the influence of variety, soil and climate, weathering, contamination with other cereal grains and foreign matter, are projected.



The automatic drying cabinet employed in the experimental manufactureof macaroni, at the Dominion Grain Research Laboratory, Winnipeg.

STARCHES

—a Scientific Study of their Characteristics

Professor M. Samec, of King Alexander University of Ljubljana, Jugoslavia, an authority on this subject, gives a short account of the results of his researches with the characteristics of starches from various sources.

STARCHES ISOLATED from different plants often exhibit differing characteristics such as variations in grain size, shape, polarisation phenomena, and X-ray spectra. When kept in an atmosphere saturated with water vapour, different starches adsorb different quantities of water, thereby evolving different amounts of heat. Hydrochloric acid and salts are not always adsorbed in the same manner, and colour variations follow admixture with iodine. Variations also occur on contact with dyestuffs such as gentian violet, safranine, water blue, orcein and eosin.

Differences are also noted in the gelatinisation temperature and in the reactions which result from treatment with chloral hydrate, chromic acid, pyrogallic acid, ferric chloride, and Purdy's solution. Dilute acids also give different products with each starch species, different quantities of furfural being formed. Assimilation by diabetics also proceeds differently.

Typical curves for each starch are obtained by plotting on a given scale the intensity and velocity of some of the reactions mentioned. In his great work* E. T. Reichert characterised about 400 starches in this manner. Although of high descriptive value, such curves do not explain the variations in starch grains from different sources.

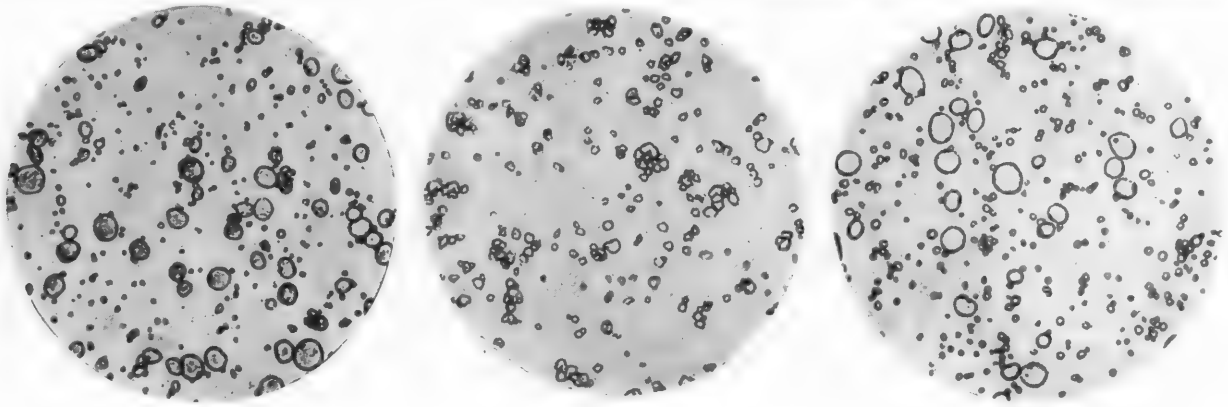
* *The Differentiation and Specificity of Starches in Relation to Genera, Species, etc.* Washington, 1913.

These differences also manifest themselves when starches are made up into pastes and solutions. Pastes vary in stiffening power for pigments and textile threads and in adhesiveness. Solutions prepared under pressure vary considerably in appearance, viscosity and osmotic pressure. Differences occur in electrical conductivity, behaviour with boiling water, iodine absorption and degree of loss capacity for hydrolytic decomposition with diastatic ferments.

Most of these variations occur haphazardly rather than in a systematic manner, so that it has been impossible to decide whether morphological, physical, or chemical factors are responsible in a given instance. Some light has been thrown upon the problem, however, by studies of the colloidal and physico-chemical properties of starch solutions.

At the outset certain terms must be more exactly defined, as there now exists some ambiguity in nomenclature.

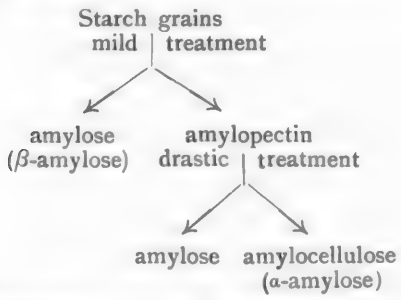
The material composing starch grains is known to vary in stability. Drastic treatment (*e.g.*, with hot water, acids, or saliva diastase) leads to solution of the greater part. The small proportion of resistant material is known as amylocellulose, and the soluble portion is usually known as amylose or β-amylose. But even mild treatment reveals differentiation. On heating starch grains in water at a temperature only a little above the gelatinisa-



Barley. Oats. Wheat.

FIG. 1.—Photomicrographs of starch grains provided by Mr. J. Stewart Remington. (× 160.)

tion point, a small fraction can be separated as sol (amylose) and a larger fraction as gel. The latter forms a "paste" and was designated "amylopectin" by Maquenne. This behaviour can be summarised in the following scheme:



Electrodecantation has been successfully employed for fractionation. If starch solution prepared under pressure is subjected to electrodialysis, a viscous fraction (amylopectin) settles to the bottom or is retained on the + membrane, while an almost clear and highly mobile aqueous phase (amylosol) separates on the other side more or less sharply. Sols of amyloses from different starches are almost identical, but the amylopectin varies with the starch species. This fraction also contains the substances accompanying the starch polysaccharide—namely, phosphoric acid, silicic acid, proteins, etc.

In a good potato starch the amylopectin separates as an almost clear, colourless, and glutinous liquid sharply distinct from the sol. In the case of wheat starch, the fraction is dirty white, opaque, and flocculated, and separates very slowly. All other species of starch give products ranging between these two extremes. Amylopectins also differ in electrochemical behaviour. That of potato is a relatively good conductor of electricity, has an acid reaction and can be neutralised with alkali. It contains 0·175 per cent. P_2O_5, and this quantity of phosphoric acid corresponds quantitatively to the hydrogen-ion concentration and the capacity of neutralisation of potato starch amylopectin. The phosphoric acid remains in part in organic combination when subjected to diastatic or acid hydrolysis, so that we may put forward the hypothesis that potato starch amylopectin contains a polysaccharide phosphoric acid ester which is responsible for many of its properties.

Wheat starch amylopectin also contains a high proportion of phosphorus (0·12 per cent.), but does not exhibit acid reaction and is a very poor conductor of electricity. Detailed study revealed that the phosphorus in this amylopectin is linked to nitrogenous substances, possibly in the form of a protein-amylophosphate or a phytovitellin. This substance imparts to wheat amylopectin quite other properties than does the amylophosphoric acid to potato amylopectin. Thus, on removing part of the nitrogenous component with pepsin, hydrochloric acid or very dilute caustic potash, the wheat amylopectin becomes similar to that from potato. When potato amylopectin is neutralised with gelatine or albumen it becomes similar to wheat amylopectin. Those amylopectins isolated from other starch species vary between these two extremes. Of very great interest is the fact that X-ray spectra also lead to classification in two extreme forms.

Our foregoing researches were supplemented in an interesting manner by those of T. C. Taylor, who found that many starch species (wheat, cassava) contain fatty acids esterified with the polysaccharide. These esters of fatty acids are present in the more resistant fraction of the starch grains (*i.e.*, in the fraction we named amylopectin and which Taylor named α-amylose). Apart from the above-mentioned substances, the properties of starch species are also influenced by the amount present of a substance which turns reddish-violet to red on treatment with iodine. If starch is boiled under pressure for several hours and the amylopectin fraction is electrodialysed, the first products obtained are sols that turn blue with a little iodine; these are followed by sols which turn green with much iodine, and later by those which yield a reddish-violet and, finally, a red colour. More exact examination of these sols led to the following results:

The starch component turning blue with iodine (which we call amylo-amylose) shows a strong tendency to aggregate and coagulate, and possesses a high degree of adhesiveness and stiffening power; on drying, the coagula of this component are solid and horny, and, on heating, only re-dissolve in water to a slight extent; α- and β-amylase quantitatively transform this component into maltose. The properties described are manifested to a lesser degree by the component giving a red coloration with iodine (erythroamylose). Treatment with malt

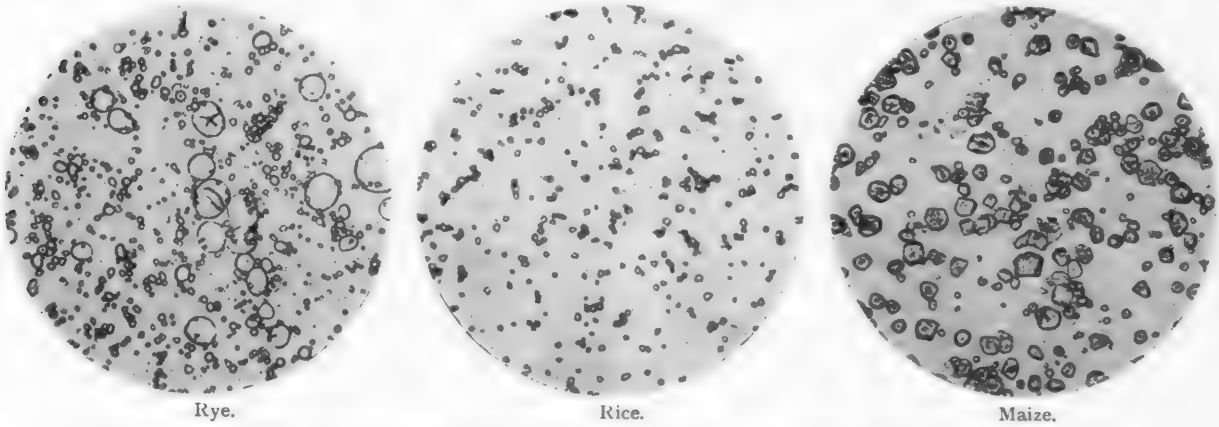


FIG. 2.—Photomicrographs of starch grains provided by Mr. J. Stewart Remington. (× 160.)

(β-amylase) yields sugar without residue, although hydrolysis with α-amylase leaves a residue identified as a hexa- or tri-saccharide. Cautious initial fractionation reveals the presence of these erythroamyloses in the amylopectin fraction.

In the light of the researches to date, differences between the starch grains of different plant species are due to the presence of the following substances:

(1) Amylophosphoric acid and its salts.
(2) Phosphoric acid protein component.
(3) Esters of fatty acids.
(4) Silicic acid.
(5) Starch substances giving red and blue colorations with iodine.

The starch grain as well as the amylopectins isolated mainly comprise molecular aggregates (molates, micelles) of amyloamylose. Possessing strong surface properties, they form a framework (complex of micelles) that is relatively difficult to destroy. The erythro-substances and the above-mentioned substance may also contribute to the structure to a greater or lesser extent.

In the amylopectins of potato species (potato, curcuma, canna) we find, in addition to amyloses, phosphoric acid esterified with erythro substances and possibly also with the amylo substance. A particularly strong tendency towards hydration is caused by the ionogenic groups of phosphoric acid, while the erythroamyloses constitute a somewhat loose linkage between the micelles. On gelatinisation such starch grains can adsorb an unusually large amount of water in the complex of micelles. The refractive index for light rays of micelle complexes of maximum degree of hydration is almost the same as that of water, so that the amylopectin fractions present a somewhat clear appearance. The tendencies towards hydration and aggregation are equivalent, and threads of such an amylopectin can therefore be formed. In the grain of wheat starch we find the small amount of hydrophilic compound of polysaccharide-phosphoric acid-protein located in the framework of the amylosols. The erythro substances are evidently present in smaller quantity. The tendency towards hydration in this starch is much smaller, but the micelle complexes possess greater firmness. Consequently wheat amylopectin does not form a solid homogeneous gel after separation by electrodialysis, but separates in the form of a flocculated white mass or lumps. Amylopectins from this species are therefore very mucilaginous and only form short threads.

Hydration tendencies are counteracted in the case of the pure amylo-amyloses by the superior molecular attractive strength. Even in low concentrations, they form highly compact, almost horny gels, very resistant to deformation and only dissolve in water at elevated temperature under pressure.

The colloidal conditions arising from the chemical nature of the admixed substances also appear to influence the X-ray spectra. Those starch species possessing, according to this discussion, a high hydrating power, exhibit the spectra common to all starches when swollen with water and allowed to stand (spectra of retrogradation). The starches of wheat, however, which possess no great hydration power exhibit a spectrum with but a small number of lines.

INVERT SUGAR—A New Source

Syrup extracted from Cashew Apples

A "SCIENCE note" in *Current Science* (vol. 3, June, 1935, No. 12, p. 627) records that the Department of Industries, Madras Government, recently organised a demonstration at Mangalore of the preparation of sugar syrup from the cashew apple. The cashew fruit is at present mainly exploited for the cashew nuts, but apparently the Madras Government hopes to see the production of cashew syrup established as a cottage industry.

The juice extracted from the pulp of the fruit contains about 10 per cent. of invert sugar. This juice cannot be used without purification: it goes bad very quickly, and when fresh contains tannin, phenols, and other undesirable substances. Preservation and concentration are performed by adding a little slaked lime, filtering off the precipitate through cloth, then adding a little acid to the filtrate, and heating in an open pan over a fire, until the liquid is reduced to about a sixth of its original volume. This is the method recommended for domestic use, but obviously more efficient methods of evaporation could be employed on a larger scale.

The syrup obtained by the cottage process is said to be thick, golden yellow, and almost odourless. Five fruits yield about one ounce of syrup. Since the solid matter of the syrup consists entirely of invert sugar, it is easily assimilable when used as an article of diet. The writer of the science note suggests that its most important use would be as an ingredient of preserves and confectionery. He omits to add, however, the possibilities of the cashew syrup as winter food for bees. The production of inverted syrup by the usual chemical methods available to beekeepers is not always easy or satisfactory, and recent research has in fact shown that some of the recommended methods result in a syrup which is inverted to a *less* extent than untreated boiled cane sugar.

For beekeeping purposes, cashew syrup, being perhaps not entirely devoid of flavour, may have advantages compared with syrups prepared with the aid of invertase. This is a supposition which experiment alone can test.

HUGH NICOL.

BAKING DIFFICULTIES

(Continued from opposite page.)

reasons at all times desirable. The multiplication of the spores can be reduced by taking care to remove daily all traces of dough, grease, etc., from floors, walls, and equipment. The organism will not thrive in an acid medium, and the addition of 1 pint of white vinegar per barrel batch of dough is recommended in shops where there is a tendency to its development. Strangely enough, no mention is made of the finest rope inhibitor, which is acid calcium phosphate. Methods for the tracing of the source of the infection are given and instructions for the sterilisation of the bakery by live steam or formaldehyde.

An interesting chapter of "Miscellaneous Information" and one hundred pages of formulæ and methods complete the volume. H. S.

Book Review

BAKING DIFFICULTIES

A USEFUL handbook for the practical baker is Wihlfahrt's *Treatise on Baking*, a new edition of which has recently appeared.* The layout and illustrations are good and the book has been brought up to date since its first publication in 1927 by sections on vitamins, additional formulæ, and the inclusion of the results of recent research.

Shortening

The shortening problem has received appropriate consideration and it is pointed out that there is probably little difference between the shortening powers of the many types of solid shortening now on the market, but economies can be effected by ensuring thorough incorporation of the fat with the dough. For this reason some bakers actually emulsify their shortening before use, thus making sure that there is perfect distribution of the fat particles. Hydrogenation has brought a new boon to the baker in preventing the development of rancidity in his shortening. The chief constituents of fats are stearin and palmitin, which are solid and too hard to use alone as shortening, together with olein and linolin, which are the fluid constituents. It is the latter oils only which are liable to become rancid, owing to the fact that they are chemically unsaturated. Hydrogenation effects the saturation of this portion of the fat, which then becomes much more stable. Another point of great importance in the process is that the hardness of the resulting fat can be controlled absolutely, since it depends purely on the proportion of the original liquid olein and linolin which is hydrogenated. In this way, by stopping the hydrogenation at any stage, a whole range of white, odourless vegetable fats of every degree of hardness suitable for every purpose can now be manufactured. Even coconut oil, cotton seed oil, and liquid oils which previously had only a very limited application in baking are now being treated and sold under a variety of trade names as solid shortening.

Improvers

The account of the origin and latest developments of "Arkady" is of interest. This is the mellifluous name given to a combination of mineral salts brought forward some years ago by the Mellon Institute for the purpose of stabilising water conditions; it is well known that variation in the mineral constituents of water used for baking will alter the fermentation period, but by adding a suitable mixture of salts it was found possible to fix the optimum period independent of changes in the water supply. This is a real advantage, but further investigation has shown that "Arkady" has several additional advantages chiefly in inducing a greater rate of gas production in the dough by bringing about the correct *p*H for the optimum enzyme activity, with the consequent more rapid conditioning of the dough. The increase is more noticeable towards the end of fermentation, so that the dough shows the "spring" which is so desirable. The gluten in the flour is also affected, so that with plenty of yeast a greater loaf can be obtained while still retaining the close grain and smooth texture of the crumb. The dryness and lack of stickiness of the dough are important in preventing the formation of air-holes and decreasing machinery troubles. The colour of the crust (which depends on the amount of sugar left in the loaf after conditioning) is enriched because more maltose is produced by the greater enzyme activity.

Temperature and Humidity

The importance of correct humidity and temperature of the dough is fully stressed and, indeed, the presence of a hygrometer both in the oven and the dough room is a necessity. The best dough temperature is recommended as between 78° and 80°. Higher temperatures are used in many bakeries and, although giving a quicker proof, render the loaf more liable to chilling with its concomitant streakiness, and is certainly deleterious to the flavour. If quality is to be considered, it is preferable to work with cooler doughs and to increase the amount of yeast, if necessary. The correct relative humidity for the fermenting room can be calculated by adding the moisture content of the flour to the percentage of liquid added to the dough batch. In any event, the relative humidity should never go below that of the normal atmosphere (65 per cent.) and, although the provision of automatic air-conditioning is out of the question for the small bakehouse, instructions and a diagram are given for making a simple, but effective, steam humidifier. Such provision is of special importance where the dough room is in close proximity to the ovens.

Ropiness

A chapter is devoted to the rope problem. Rope is the result of the infection of the dough by a bacillus which is not killed by the heat of the oven and develops in the loaf on keeping, with a resultant discoloration and disagreeable taste. The opinion is expressed that the bacillus is mostly introduced from the air by dust particles, although occasionally flour or other raw materials may be infected. There is some divergence of opinion on this point, many investigators stating that infection is chiefly introduced in flour made from improperly cleaned wheat; some credence is lent to this by the fact that the soil is the natural home of the bacillus. Certain factors are conducive to its growth, particularly moist heat and a low *p*H. It is for this reason that the trouble is more prevalent in the summer, and the rapid cooling and drying of the loaf are for this and other

(*Continued on previous page.*)

* *A Treatise on Baking* (2nd edit.), 1934, by Julius E. Wihlfahrt in collaboration with Robert W. Brooks, published by Standard Brands, Inc., 595, Madison Avenue, New York. Price $1.

WELDED PLANT

— for the Manufacture of Food

By J. HINDE, M.I.W.E.

EQUIPMENT THAT is used for making containers or for labelling and the general handling of packed foods, though an essential part of any process, does not usually call for special materials or fabrication. Plant coming into direct contact with the food must be carefully chosen and designed to avoid contamination of any kind. There is a wide variety of metals and finishes available suitable for food manufacturing plant, but to be of value it is essential that any material should be capable of being fabricated into the desired form. Except for the smaller articles some method of joining parts together is inevitable. For light gauge material soldering may be employed, though some discretion is necessary over the choice of solder. Brazing, too, can be applied, especially to copper. With riveting or bolting it is difficult to obtain a flush contact-surface. Of all the methods of joining available, welding is probably the best for the fabrication of food manufacturing plant.

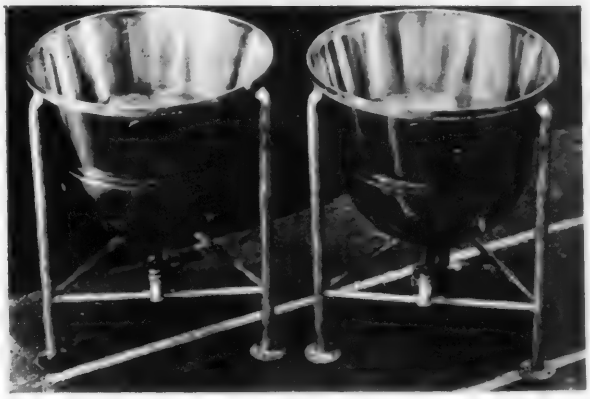
At one time welded plant was very much out of favour, but such rapid developments have taken place in the technique of welding that it is now a very important factor in modern engineering construction. Various British Standard Specifications relating to welding are in existence and others in the course of preparation. The insurance companies are quite prepared to accept properly designed welded plant. There are many types of welding, but those most applicable to equipment for the food industries are the metallic arc and gas, usually oxy-acetylene, processes.

Any vessel that comes into contact with food must be of good finish. Specially smooth or polished plates may be employed and the weld bead must be treated to conform with that finish. In some cases the weld may be planished, in others it will have to be carefully ground and polished. So treated it is very difficult to distinguish, the weld and the plant is virtually in one piece. The application of modern technique and the use of the correct electrode or filling-wire, together with suitable fluxes, result in the weld deposit being of the same composition as the parent metal. The weld must be free from blowholes and other physical imperfections and should not undercut the plate; obviously such a weld will be mechanically sound and of the required strength. Where the weld does not come into contact with the food or where a smooth surface is not essential, no grinding or planishing is necessary, and though it may stand out from the plate a little the bead has quite a neat appearance.

(By courtesy of the Aluminium Plant and Vessel Co., Ltd.)

A typical Oxy-Acetylene Welded Aluminium Food Processing Vessel.

For lard rendering and the general treatment of certain oils and fats, mild steel equipment is quite satisfactory. There is no contamination, and under the circumstances rusting is not possible. Austenitic stainless steels, though of comparatively recent origin, have many applications in the food industries. Among the users of stainless steel plant are those engaged in the dairy, brewing, and canning industries. The steel can be used in contact with practically all foodstuffs, whether acid or neutral in reaction, without any harmful effects. Some difficulty was experienced with the original welded stainless steel equipment because of the trouble known as "weld-decay", but fortunately steels are now available which are quite free from that defect. For material thinner than 16 s.w.g. oxy-acetylene is employed and, provided correct flame adjustment is maintained and excess of either oxygen or acetylene avoided, the weld will have all the intrinsic properties of the



Two 50-gallon Steam-Jacketed Pans in Stainless Steel of Welded Construction, made by the Aluminium Plant and Vessel Co., Ltd.

plate. Some oxy-acetylene welding is so neat that for certain purposes grinding and polishing is unnecessary. For thicker material the metallic arc process is better; the electrode should be of such design as to prevent excessive atmospheric contamination of the weld and to compensate for the chromium lost by volatilisation. Whichever type of welding is used it is essential that all scale be removed; grinding or polishing automatically does this, otherwise treatment with a suitable descaling solution is necessary.

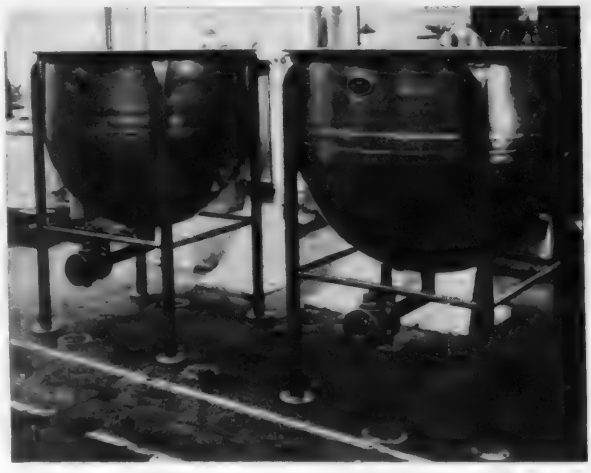
(By the courtesy of Thompson Bros. (Bilston) Ltd.)

Electrically Welded Stainless Steel Cream Vat showing internal parts.

Pure malleable nickel and various nickel alloys have established applications among the food industries. Pure nickel can be satisfactorily welded; the metal is somewhat weak just after cooling, but that is a problem for the fabricator. Welded jacketed pans, autoclaves and general equipment have all been made from nickel and have given complete satisfaction. The nickel alloy Inconel was developed primarily for dairy work, but the metal has excellent corrosion resisting properties and its application to other industries is extending. Monel metal, the well-known nickel copper alloy, is used in the canning industry; welded jacketed syrup pans with a working pressure of 45 lb. per square inch are in service. Monel metal equipment is also used for handling gelatine and for the component parts of many proprietary types of apparatus. Both these nickel alloys can be satisfactorily welded and the weld relied upon to have all the desired properties.

The metallic arc welding of aluminium is not yet a commercial success. Autogenous welding, either oxy-acetylene or oxy-hydrogen, is, however, very widely practised. The essentials of good aluminium welding are the use of the correct flux and careful alignment of the parts. Aluminium oxide is very easily formed and unless a flux capable of dissolving it is used the welds will not be satisfactory. As the flux is hygroscopic and corrosive it must be washed away when the welding is completed. The coefficient of linear expansion is high, and unless care is taken during the alignment of the parts to be welded excessive distortion may result. Some distortion is inevitable, but aluminium vessels can be bent back to shape rather easily and the welds are quite capable of withstanding such treatment. Hammering of the weld improves the physical properties; after the completion of careful planishing it is often quite impossible to detect the weld by ordinary examination. Aluminium itself is not a very strong metal, but various alloys are available of equal corrosion resistance, but with the strength of steel. Alloys dependent upon heat-treatment for their mechanical properties are not suitable for welding. The magnesium-manganese alloys have a high strength and can be satisfactorily welded, though they are somewhat difficult to manipulate and the removal of distortion is not so easy. The magnesium alloys are of intermediate strength, and they too can be welded. The non-toxic properties of aluminium have been questioned, but it has been definitely established that the metal is not injurious in the amounts likely to be derived from food manufacturing plant.

Various coatings are used and may be applied to welded mild steel. The welding of mild steel which is to be subsequently glass enamel lined calls for some skill. Any defect in the weld gives rise to trouble during the enamelling process. Other coatings include galvanising by the hot dipping process, though the application of zinc-coated equipment is somewhat limited. Steel or copper may be tinned. Aluminium,



An interesting Welded Combination by the Aluminium Plant and Vessel Co., Ltd., of a Nickel Inner Pan, and a Monel Metal Outer Jacket for Steam Heating. These vessels are of 200 gallons gross capacity.

Oxy-acetylene Welded Stainless Steel Trays for carrying meat, made by Thompson Bros. (Bilston) Ltd.

nickel, tin, zinc, or copper coatings may be sprayed on to steel surfaces by the metallisation process. The life of all coated equipment depends entirely upon the efficiency of the coating. If the surface is damaged or scratched contamination may result, but several of those mentioned have given good service.

The effect of most metals upon food has been rather carefully studied and their toxic or non-toxic properties determined. One advantage of welded plant is that the weld can be made to have the same composition as the parent metal; therefore, if it is known that the plate is satisfactory there will not be any contamination from the joint. The finish of welded plant is very good and internal welds are sometimes impossible to detect, there are no crevices likely to retain traces of the product and so affect the subsequent charge. Not only is the composition of the weld satisfactory, but the mechanical properties are good and welded jacketed pans or pressure vessels can be used with absolute safety.

(By the courtesy of Aluminium Equipment Specialists.)

Portable Margarine Container of one ton capacity, constructed of sheet aluminium 99·5 per cent. purity and mounted in galvanised steel frame.

BOTULISM

The Press Adopts New Tactics

THE recent death of three people in London from botulism is an event of first importance to the food industry, not only on account of the exceedingly rare occurrence of the disease, particularly in this country, but also because its deadly nature is liable to throw the Press, and through it the public, into something like a state of panic. Fortunately in this instance—unlike the majority of food poisoning cases which are reported—the coroner happened to be a man of good sense and discretion, and by a firm, tactful handling of the case he actually succeeded in turning into an advantage for the food industry what might easily have been a disaster of the first magnitude, although no doubt part of the credit must be attributed to the canners for their prompt action in the matter. The Press also for once broke away from their traditional practice of sensationalism and allotted a surprisingly large amount of space to a really informative and sober account of the true facts of the disease, which were calculated to hold in check the public imagination. It is to be hoped that this marks a permanent change in tactics on the part of the Press in their handling of food poisoning cases, not only in the interests of truth and common sense, but also in the interests of their own papers, a good proportion of whose revenue is derived from the advertising of food products. Hitherto they appear to have completely disregarded the perfectly reasonable demands of their advertisers for a fair statement of cases of food poisoning which arise from time to time, preferring to pander to the craving of their readers for cheap, morbid sensationalism.

The canners have tackled with remarkable force and promptitude the false impression conveyed by the use of the word "canning" for both canned and bottled goods. Had the original statement by the medical officer been allowed to pass unchallenged, the British canning industry would have been almost wrecked in its infancy. As it was, the publicity given to the facts presented by Mr. Hirst and Mr. Adam of the Campden Research Station should prove to be of greater benefit to the industry than years of national advertising. It is, in fact, impossible to conceive of more impressive and generally favourable circumstances for driving home the fact that canned foods are safe, not only from botulism but also from other risks; it came as a dramatic relief from a state of widespread fear and suspicion and will undoubtedly make a deep impression on the public mind. It now remains for canners to keep up with this sudden accession to their reputation by taking every possible precaution to safeguard quality. Incidentally, let them offer up thanks to Heaven for having dropped down into the middle of England a Hirst and an Adam and a research station worthy of its name; and with these we have, of course, to couple the London station under the able direction of Mr. T. Macara, F.I.C.

Poisonous Metals *in* Foodstuffs

We have had at different times so many enquiries about the legal requirements relating to the amounts of poisonous metals in foodstuffs that we have asked the authors of this article to discuss the question in a general way, stating the position as it is at present.

by T. McLachlan, A.C.G.F.C., F.I.C. and D. M. Matthews, B.Sc.

IT MAY surprise most food manufacturers to learn that there are at present no Statutory limitations as to the amounts of poisonous metals which are permitted in foodstuffs, although various Commissions have made sundry recommendations, with which it is advisable to comply.

Arsenic

Naturally the first metal to be considered is arsenic, which, prior to the arrival of canned food, ranked with ptomaines as a periodic source for scares. In 1900 there was a serious outbreak of poisoning, the cause of which was traced to the contamination of beer with arsenic, which, in turn, originated from the use of glucose, prepared by hydrolysis with sulphuric acid. At that time sulphuric acid was invariably made from pyrites containing a fair proportion of arsenic, by the lead chamber process, a method which also introduced an appreciable quantity of lead into the final product. Sulphuric acid is now prepared almost entirely by the contact process, and, owing to the risk of poisoning the catalyst, great care has to be exercised to use only the purest constituent chemicals. Sulphuric acid is one of the fundamental reagents used in the preparation of numerous other chemicals, such as hydrochloric acid, glucose (liquid and solid), glycerine, boric acid and borax, phosphates, coal tar dyes, caramel, etc., but now there is little danger of arsenic being present in any of these substances and the chief fear of arsenical contamination in this way has automatically disappeared.

A Royal Commission was appointed to enquire into the subject after the scare in 1900, but in 1902 another mild epidemic occurred due to the use of coke for drying malt, and a Special Committee was thereupon set up. This Committee recommended that no substances used in food should be allowed to contain more than 1/100 grain of arsenic in one pound of solid food or 1/100 grain of arsenic in a gallon of liquid food. In 1907 the Inspector of Foods suggested to the Local Government Board that this limit of 1/100 grain per pound should be extended to tartaric acid, citric acid, and cream of tartar, while in 1911 the Local Government Board wrote to the Vinegar Brewers' Association recommending that not more than 1/100 grain should be present in vinegar, and again in 1916 the Board drew attention to the presence of arsenic in baking powder due to the use of impure calcium phosphate.

It will thus be realised that, even if no Statutory limits are in force, definite limits have been suggested and have been upheld so frequently in disputes that they may now be accepted as the correct legal basis.

At the present time, however, a considerable quantity of green tea entering the country is condemned on account of carrying an excessive amount of arsenic, derived from fumes during processing. In 1926 another potential source of contamination was noticed as a result of the spraying of apple and other fruit trees with lead arsenate.

The Food and Drugs Acts describe food as being anything which normally enters into the composition of food, and, on this basis, food colouring materials might be expected to conform to the same standards as other foodstuffs. In 1928, however, the Association of British Chemical Manufacturers and the Society of Public Analysts decided that the following quantities should be regarded as standards for food colouring materials:

(*a*) In a pure straight colour, 5 parts per million, or 1/30 grain per pound.

(*b*) In colours diluted with not more than 2 parts of diluent, 3 parts per million, or 1/50 grain per pound.

(*c*) In colours diluted with more than the above, 1·4 parts per million or 1/100 grain per pound.

Generally speaking, the dominions have been content to follow the lead of the mother country with regard to the permissible limits for arsenic in foodstuffs, but Canada has the following:

	Parts per million.
Citric acid	1
Tartaric acid	1
Cream of tartar	2
Sodium bicarbonate	2
Calcium phosphate	5
Sodium phosphate	5
Baking powder	2
Coal tar colours used in food	10

Tin

The development of the canned food industry has naturally led to investigations into the possibilities of tin acting as a poison and to the amount which should be permitted. Contamination of foil-wrapped goods sometimes occurs, as, for example, with cheese. Hehner (1880) was the first to notice that tin might be present in foods, and Winter Blyth (1883) reported amounts varying from 1½ grains to 11 grains per pound in canned fruits and tomatoes. In the early part of this century the Local Government Board found, during an investigation, that tinned meat extract, which had travelled to and from South Africa, contained 22 grains of tin per pound, and that a sample of canned pineapple contained

8½ grains per pound. The recommendation was put forward that canned goods should not contain more than 2 grains per pound, and this suggestion has usually been accepted as a standard, while in Australia, New Zealand, and South Africa these quantities have been made official.

Lead

Lead may occasionally become an accidental source of contamination in food, due, for example, to the use of lead chamber sulphuric acid (mentioned above), to solder used for canned goods, to a high proportion of lead in tin foil, or to the use of lead arsenate for spraying. At one time considerable controversy raged around the amount of lead dissolved by water from standpipes. Some time later the quantities which should be present in cream of tartar aroused discussion, with the result that a Local Government Board Food Report was issued in 1907 suggesting that citric and tartaric acids and cream of tartar should not contain more than 1/7 grain per pound. These limits were incorporated into the 1914 Pharmacopœia, and while some authorities claim that they are too severe for foodstuffs in general, they have been adopted officially for this purpose in Australia, New Zealand, and South Africa. In 1911 the Local Government Board issued a letter in which it was recommended that lead should be absent from vinegar. On account of the possibility of contamination by lead from tin foil containing this metal, many countries prohibit the direct contact of foodstuffs with tin foil containing more than traces of lead.

Copper

For many years it was considered quite permissible to copper vegetables in order to improve the colour by the formation of a green compound between the chlorophyll and the metal, but again discussion arose as to the quantity which should be allowed. In 1901, however, the Departmental Committee recommended that the addition of copper salts to vegetables should be prohibited. A minority report by one member suggested that the use of copper in a quantity not exceeding ½ grain of copper sulphate per pound of foodstuff should be permitted, and this minority report was usually accepted as the standard until the Public Health (Preservatives, etc., in Food) Regulations of 1927 made it illegal.

Zinc

Zinc is sometimes found in dried fruits and notably in gelatine, due to their being dried on galvanised iron wire frames, and in ice-cream, which may be stored for long periods in galvanised iron containers. In conjunction with methylene blue it has been employed as a colouring material for peas, and also as a fixative in vinegar and canned greens. No limits have been suggested by any responsible body in this country, but in Canada dried eggs are allowed to contain up to 150 parts of the metal per million parts of egg. Occasionally zinc has been shown to be present in food, due to the use of galvanised iron cooking vessels. Such vessels are uneconomical in the long run, and since better materials are available for utensils it is difficult to see why zinc should be permitted at all.

Aluminium

One continually hears rumours that aluminium in food is dangerous, and yet many of those who decry its presence in their food will swallow large quantities on the advice of the doctor as a cure for indigestion. Colloidal aluminium is regarded by many as one of the most useful adsorbents of acid and gas in the stomach, and if it is useful when present in such an active state it is difficult to understand how it can be such a dangerous poison when present in smaller quantities in food. At the same time, owing to the action of a small but vigorous body of enthusiasts some years ago, it is now inadvisable to use alum in bread or similar products, as it will inevitably be condemned.

Antimony

Until recently little notice has been taken of antimony, probably for the simple reason that everyone regarded tartar emetić as a sufficiently dangerous warning. Unfortunately, enamel manufacturers, in their search for cheap opacifiers, stumbled across antimony oxide, with the result that as early as 1925 the Ministry of Health issued a warning as to the possible dangers attaching to its use. In 1928 an outbreak of poisoning occurred due to the use of enamelled vessels for making lemonade. The quantity of antimony present in the lemonade amounted to about 10 grains per gallon, calculated as metallic antimony. Other cases have occurred during the last few years, and suggestions have been put forward by the Ministry of Health that the use of antimony in hollow-ware should be (*a*) prohibited, (*b*) allowed only as the pentoxide or its compounds, or (*c*) allowed only on goods which are definitely labelled when sold.

Suggestions for Standards

It is rather difficult to make suggestions for standards, since one is open to general criticism, but there can be little doubt that some form of legal standardisation with regard to metallic contamination is necessary, to act as a guide both to the manufacturer and to the Public Analyst. It is unnecessary to enter into a detailed explanation of all the reasons for the suggestions put forward below, but, stated briefly, we propose the following limits:

Arsenic:	
in liquids	1 part in 10,000,000
in solids	1 ,, ,, 1,000,000
Lead:	
in liquids	1 ,, ,, 500,000
in solids	1 ,, ,, 50,000
Tin	1 ,, ,, 10,000
Zinc	1 ,, ,, 10,000
Antimony	1 ,, ,, 500,000

For substances which enter into the composition of foods only in small quantities, such as colouring matters, flavours, etc., these limits could, with advantage, be increased fivefold. It would be to the general advantage if all the limits were made in parts per million, since the metric system is now being generally adopted. With regard to the use of antimony for hollow-ware, we are in favour of its total prohibition. Drugs should be subjected to the same general regulations as foods with re-

(*Continued on opposite page.*)

Quick Freeze-Carbonation Method *for* Egg Preserving

EXPERIMENTS CARRIED out by T. C. Swenson and L. H. James, of the Food Research Division U.S. Bureau of Chemistry and Soils, indicate the advantages of quick freezing as applied to egg processing plants in effecting an improvement in the quality of the product. The customary practice is to freeze eggs at about 40° to 50° F., but the authors suggest that the process be speeded up by employing lower temperatures and also that an additional advantage, in respect of ensuring freedom from spoilage organisms, would be gained by carbonating the egg meats just prior to freezing. The authors do not, however, discuss the means to be adopted in commercial practice for applying these methods.

Below is a summary of the report which was published in the U.S. *Egg and Poultry Magazine*.

Bacteria in Eggs

It is generally assumed that the edible egg within the shell is comparatively free from bacteria when laid. However, by virtue of the actual process of laying, the outside of the shell may carry numerous organisms. After the egg is laid the outer shell comes into contact with the nest straw or litter, clean or otherwise. The hen may step on the egg or smear it with her feet, an excellent opportunity to give the shell a rich inoculum of soil types of micro-organisms. The gathering of the eggs, the candling and packing are all done by human hands, which may or may not carry appreciable numbers of micro-organisms. There can be no doubt that the external shell of an egg is afforded ample opportunity to accumulate various types of bacteria, and probably bacterial spores, before it leaves the poultry house.

In egg breaking and freezing establishments the eggs are again handled by human hands. Eggs are broken by being struck sharply against a blunt knife edge mounted horizontally, edge uppermost. It is obvious that such sharp, sudden cracking would tend to jar loose many of the surface adherent organisms, and many of these find their way into the "broken-out" egg meats.

Bacteria need a moderately warm temperature and a favourable medium for rapid development. Egg meats make an excellent medium for bacterial growth, and any delay in the breaking room after the eggs are opened may be considered as an incubation period, affording certain types of organisms a chance to start growth and multiplication. Thus it will be readily inferred that time is an important element in the handling of a high quality frozen egg product. It is essential that the lapse of time, from the point at which the egg is opened until it is frozen, be shortened as much as possible, thereby giving little opportunity for bacterial development.

Prompt and Careful Handling

The experiment reported was designed to show the importance of prompt and careful handling. A comparison is given in which is also shown the value of quick freezing over the type of freezing generally in practice, which is relatively slow. The temperature used for the quick freeze was that of solid carbon dioxide (dry ice) or about minus 109° F. The liquid egg was frozen solid within two hours. In the slow freeze the delay period (before freezing) was exaggerated, the eggs being held longer than good practice to show the significance of delays in handling. The cans of liquid egg to be frozen in this way were held at 40° F. for eighteen hours, then placed in the freezer room at zero deg. F. The liquid egg was frozen solid after another eighteen hours, thus making the slow freeze cover a total period, after breaking, of thirty-six hours.

In a table published with this report some interesting results are presented. An analysis of the data shows the following:

Fewer organisms survived the quick freezing than the delayed slow freezing.

Carbonation was detrimental to the survival of colon aerogenes types of bacteria.

Combined "carbonation" and "quick freeze" gave the best results of all conditions studied.

Conclusions

The experiments show that quick freezing in itself yields a better egg product than does delayed slow freezing. It is suggested that the carbonation of an egg batter just prior to freezing may be a valuable adjunct to the freezing process. In respect to bacterial count, carbonation is indicated. This is evidenced by the survival of fewer numbers of micro-organisms than in any other treatment studied. The combined use of 1 per cent. of salt and the quick freeze is also shown to be an efficient mode of treatment, which yields an excellent product after eight months in storage.

Combined carbonation and quick freezing commends itself for further study by egg packers who are interested in marketing frozen products of high quality.

Poisonous Meta's in Foodstuffs

(Continued from opposite page.)

gard to the presence of poisonous metals. There is no reason why the food manufacturer should be prevented from making tomato puree in a copper pan while his pharmaceutical friends may prepare all their extracts in plant made of this metal.

FOOD Transport Problems

BY SEA

At the Glasgow meeting of the Food Group, Dr. Smith said that about 50,000,000 tons of foodstuffs were carried every year from country to country, and the great bulk was carried by sea. Wheat accounted for more than a quarter of the total, cereals as a whole for well over one-half, and sugar for one-fifth.

The world trade in meat—about 2,000,000 tons—was rather smaller than the world trade in beverages, tea, coffee, and cocoa. Over one-half of the people of the earth ate very little meat; butter, cheese, and eggs accounted for 1,000,000 tons, and fruits for perhaps 6,000,000 tons. Bananas were more than twice as important as beef.

The share of Great Britain in this world trade was quite unique. She received more than a quarter of the cereals, more than half the dairy produce, two-thirds of the beef, and practically the whole of the mutton and pork. In terms of her own food supply she imported 80 per cent. of the wheat she needed, over 50 per cent. of the beef and mutton, 65 per cent. of the pig meat, nearly 50 per cent. of the eggs, 80 per cent. of the cheese, 90 per cent. of the butter, 75 per cent. of the apples, and all the oranges and bananas.

In the scale of her needs Great Britain was unequalled. The dependence on imported food was no new phenomenon. The briefest review of the history of food transport showed other instances where population had outstripped food production and where the acreage of foods overseas had become vital to civilisation.

The grafting of a new technique of refrigeration on to the old methods of the sea had proceeded slowly, and was incomplete even to-day. The size of refrigerated holds had increased with the rapidly growing demand, and under pressure from shipowners their architecture had gradually become modified to suit the new conditions.

The special problems of the ship as a carrier might be summed up as resting on three special circumstances—the value of space, variety of functions, and the problems of movements among waves.

A ship stored foodstuffs, if not in greater bulk, at least in greater density than any store on land would attempt. The art of stowing cargo was as old as shipping; refrigerated cargoes were more extravagant of space than general cargoes.

It was tempting to speculate on the future possibilities of atmospheric control in ships' holds. Would the gas-storage method for chilled beef be extended to the South American trade? would it be applied to other cargoes? and must the shipowner contemplate with some apprehension a future in which every cargo space had its controlled atmosphere and every ship its gas engineer?

Discussing the problem of tainting, Dr. Smith said ships could never be specialised carriers of a single cargo. Foodstuffs were, of all cargoes, the most liable to suffer from tainting, and also the most liable to taint each other. Some of the causes were simple and easily overcome; other causes were external in origin.

The study of taint might have to wait on the development of that far more fundamental aspect of food science, the chemistry and purity of flavour, which to-day was in its infancy.

Different cargoes seemed to need different methods of refrigeration. The equipment must be flexible; what was needed was an omnibus system suitable for the whole range of cargoes.

BY RAIL

Sir Harold Hartley, also speaking at the Glasgow meeting of the Food Group, said the rapid development of refrigerated transport by rail in recent years was a good illustration of the saying that every new facility created new traffic.

Not only had research extended enormously the possibilities of transporting perishable foodstuffs, but there had come a growing appreciation of the value of refrigerated transport in reducing wastage and improving the condition in which the food reached the consumer.

Perhaps the most important fresh meat traffic on rail was from Scotland to London, for which the railway companies provided very fast transit at express passenger speeds over distances ranging from 350 to 600 miles.

Most of the fish landed in this country had to be conveyed considerable distances, in some cases over 500 miles. The 550-miles journey from Aberdeen to London took about 13½ hours, and the moderate temperature conditions experienced during most of the year reduced the necessity for special facilities for keeping fish vans cool.

During periods of heat and humid weather deterioration was apt to occur, and much attention had been paid to the question of providing refrigeration at a reasonable cost.

An interesting application of refrigeration to rail transport was the kipper traffic from the Kyle of Lochalsh to London, a distance of 650 miles, the first portion of which was over a long and remote branch line through mountainous country.

The Stornaway kipper was very rich in oil content, and travelled in midsummer when the days were hottest, a substantial portion of the journey being made in daylight. Before methods of refrigeration were explored it was found that in hot weather the kippers were deteriorating to such an extent that the traffic virtually ceased. It was subsequently ascertained that the deterioration by loss of bloom and taste was brought about by the loss of the oil content, and that this could be prevented by lowering the temperature to about 40° F.

Temperatures lower than the dew point of the air were undesirable, since the kippers were for immediate sale, and if exposed at these low temperatures, condensation of the moisture would occur and spoil their appearance.

Trial loads were sent in insulated containers refrigerated with solid carbon dioxide, and as a result of this experiment it was found that the enhanced price of the kippers more than compensated for the cost of the refrigerant. This season there had been a heavy demand for containers to carry the traffic.

Strawberries for canning were required to be in perfect condition, and with the ordinary method of transport in ventilated vans the condition could not be relied on after a journey of more than 25 miles.

Last summer experiments were carried out in the carriage of strawberries in England in insulated vehicles, employing solid carbon dioxide as refrigerant. The object of the experiment was to determine the amount of cooling required to give satisfactory conveyance overnight.

New containers had been constructed capable of carrying 40 cwt. of fruit, and tests were continuing. The danger of deterioration of the fruit due to contact with carbon dioxide gas had been prevented by excluding the gas from the container.

Similar tests were made in the conveyance of raspberries from the Perthshire area of Scotland to a Lancashire canning factory.

The results obtained at the outset were not so satisfactory as with strawberries owing to the difficulties of finding a satisfactory method of storage of the fruit.

An improved method had now been devised in which the chips of raspberries were carried in metal trays specially designed for stacking, and these would be tried during the coming fruit season.

INDUSTRIAL NEWS

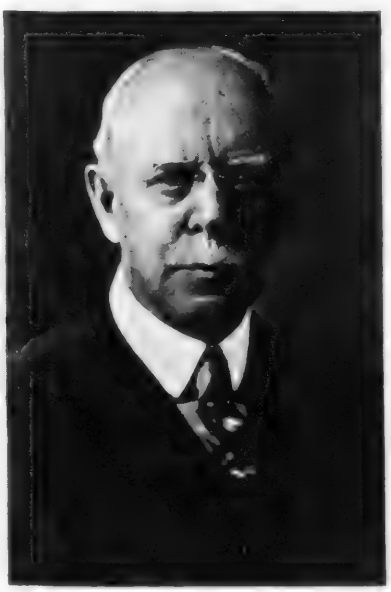
Chemical Engineering Congress

The invitation issued by the British Institution of Chemical Engineers to the American Institute of Chemical Engineers to visit this country at the time of the Chemical Engineering Congress has been accepted. Details of the arrangements are now being worked out by a special committee appointed by the Council. It is possible that a general meeting of the American Institute will form part of the programme.

Dr. Arthur D. Little

We regret to announce the death on August 1 of Dr. Arthur D. Little, President of the Society of Chemical Industry for the year 1928-29. Dr. Little, who had an unusually wide experience in the industrial development of laboratory discoveries, was born in Boston, Massachusetts, on December 15, 1863.

Dr. Little was the inventor of a number of chemical processes and was presented with the Perkin Medal in January, 1931, when he delivered an address giving a survey of the chemical industry in America. In 1918 he was awarded the degree of Doctor of Chemistry by Pittsburg University, and in 1929 he received the honorary degree of Doctor of Science from Manchester University. He served for two years, 1912-1914, as president of the American Chemical Society, and was president of the American Institute of Chemical Engineers in 1919. One of his important tasks was that of organising the National Resources Survey for the Canadian Pacific Railway, 1916-1917. He also founded the School of Chemical Engineering Practice at the Massachusetts Institute of Technology.



The late Dr. Arthur D. Little.

The Canners' Exhibition at Cardiff

The Rt. Hon. D. Lloyd George, M.P., has honoured the Committee by accepting their invitation to open the Show on Friday, October 25.

Special travelling facilities by rail have been arranged, and, on presentation of a voucher obtainable from the Secretary, return tickets to Cardiff at single fare will be issued from all stations from which the double journey can be completed on the same day. These tickets will be available only on the day of issue.

Death of Mr. B. Pulley

We have to report, with very great regret, the death, on July 23, of Mr. B. Pulley, late sales manager of the Essence Department of Messrs. A. Boake, Roberts and Co., Ltd. In spite of his long and painful illness, he maintained his cheerful spirit until the end. Mr. Pulley possessed, to a remarkable degree, the ability to cultivate the friendship of all with whom he came into contact, and his many friends will feel acutely the loss they have sustained at his early demise.

During the war he served with distinction in the London Rifle Brigade and the Machine Gun Corps. Since 1908 he had been in the service of Messrs. A. Boake, Roberts and Co., Ltd., by whom, and by his colleagues, he will be sadly missed. He leaves a widow, a daughter of 15, and a son of 8.

▼ ▼ ▼

Mr. T. Stewart Kerr, A.R.C.Sc. (Lond.), F.I.C., F.C.S., has resigned his position as Chief Chemist with Alfred Bird and Sons, Ltd., of Birmingham, to resume his work as a consulting and analytical chemist and bacteriologist at 45, Newhall Street, Birmingham. Mr. Stewart Kerr was called in by Messrs. Alfred Bird some three and a half years ago to reorganise their starch refining plant, and remained as Chief Chemist. The appointment is being taken up by Mr. R. S. Potter, who left Fardons Vinegar Co., Ltd., of Birmingham, at the end of August.

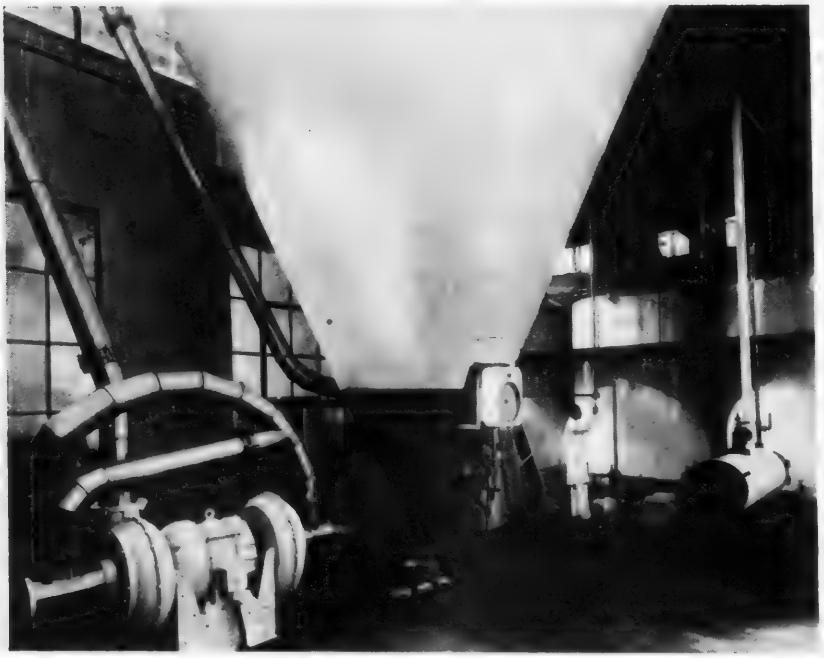
Death of Mr. Alfred W. Bush

Alfred Walter Bush was for many years one of the most prominent figures in the essential oil trade. A son of the late W. J. Bush, who founded the business bearing this name, he started his career with a firm of Colonial merchants, Messrs. Green and Pitt, after which he proceeded to Sicily, where he made a practical study of the citrus oil industry. Upon the death of his father in 1889 he was recalled to London, and subsequently participated in the formation of W. J. Bush and Co. into a limited liability company, of which he was a managing director from its inception in 1897 until his death.

The Imperial Institute

On July 4 a reception was held at the Imperial Institute in London to welcome the Delegates from the Overseas Empire Legislatures to the Conference of the Empire Parliamentary Association. Their Royal Highnesses the Duke and Duchess of York were present, and the attendance was a large and brilliant one.

It is now forty-eight years since the foundation-stone of the Imperial Institute was laid by Queen Victoria, and the wonderfully interesting and instructive collection of products and various forms of display illustrating the life and industries of Empire countries continues to attract visitors in ever-increasing numbers. The Imperial Institute has indeed good reason to be proud of the great work which it is carrying out to the immense benefit of every corner of the Empire.



A view of the lower part of the Drying Chamber at the New Milk Powder Factory of the Scottish Milk Powder Co., at Kirkcudbright, recently opened by Mr. Walter Elliot, Minister of Agriculture. This shows the powder standardiser and milk blower. On the right-hand side can be seen the three milk storage tanks, together with the milk heater and sanitary milk pump.

Better Ice-Cream

Dried Milk Products, Ltd., of Dominion Buildings, 2, South Place, London, E.C. 2, have produced an extremely comprehensive booklet entitled *Better Ice-Cream*. Many valuable textbooks are already available on the technology of ice-cream making, so that no attempt has been made in this publication to cover in detail the many important phases of its production. The company states that the booklet is intended solely as a guide to the selection and uses of the principal components of the mix (milk and its products) and to present simple methods for calculating the mix and determining over-run percentage.

Information is given on important steps in the production of quality ice-cream, processing the mix, calculating the over-run, causes and remedy of defects in ice-cream, etc. An appendix gives the procedure necessary for calculating the proportions of ingredients of various compositions to arrive at the desired percentages of fat, M.S.N.F., sugar, and gelatin for the ice-cream mix.

Brush Transformers

A well-produced brochure of thirty-two pages has recently been issued by the Brush Electrical Engineering Co., Ltd., Falcon Works, Loughborough, entitled *Brush Transformers*. The pages are of cream-coloured art paper, and there are a large number of illustrations of the company's products.

Brush transformers are made in sizes from ¼ kVA, while the designs provide liberal rating. The transformer department of the company occupies a modern and completely equipped building, and further facilities have been effected in the shops to handle a still greater volume of business.

The company will send a copy of this brochure to any reader of FOOD MANUFACTURE who is interested.

Air and Gas Compressors

Peter Brotherhood, Ltd., Peterborough, England, have sent us a copy of their new publication, which illustrates and describes some of the many hundreds of compressors of different types which the company makes for general and specialised purposes. The booklet deals chiefly with compressors for the higher pressures, and contains illustrations of High Pressure Compressors, Hydrogen Compressors, Compressors for Liquid Air and Oxygen Plants, Compressors for Compression and Liquefaction of CO_2, Ammonia Compressors, High Pressure Compressors for Torpedo Service, etc.

The first Brotherhood compressors ever built in any numbers were for the high pressure (about 750 lb. per square inch) then required for use with the newly invented Whitehead Torpedo, and since that time the company have continued to design and construct compressors for all pressures and purposes.

"Food Manufacturing Equipment"

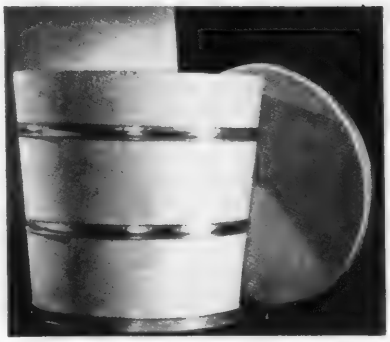
This is the title of the second part of what is described as a guide to the uses of Monel metal, nickel, and inconel in the food industries and is issued by Henry Wiggin and Co., Ltd.

In their introductory paragraphs the authors wisely remark that whilst the metals are employed for numerous purposes their use depends upon a particular corrosion problem, and, they add, it is not always possible to assert that one material is the best to meet all conditions. This is probably more applicable in the food industries, in which conditions vary so much, than in any other industry.

The descriptive matter which is given under the names of chemical substances, foodstuffs, and equipment in alphabetical order is not exhaustive, but it will be very valuable to food manufacturers contemplating the design or installation of new plant. The second part of the guide now issued starts at D for Dough and ends at J for Jacketed Drums.

The new Ice-Cream Factory of Dicky Bird, Ltd., at Barking.

Acme Steel Tub Hoops



Acme Steel Tub equipped with galvanised hoops.

In the current advertisements of Acme Steel Company, Chicago, directed to butter tub users, the product—tub hoops—is dramatised by means of particularly distinctive photographs. It is believed that this type of advertisement will attract considerable attention and help to establish a quality atmosphere for butter tubs equipped with Acme galvanised hoops.

The entire area of the full-page advertisement is devoted to a half-tone of the tub illustration, with a small mortised area for brief copy. The Acme name is shown in reverse at the bottom of the advertisement.

The copy points out the importance of the package in obtaining highest possible grading and pricing for butter, and that the tub with Acme hoops will do its part. Thus the advertising goes direct to the buyer of tubs, helping the tub manufacturer. The accompanying illustration reproduces one of the photographs used.

A New Box Opener

The Gordon Package Co., Ltd., of 47, Finsbury Court, London, E.C. 2, are marketing a new tool for opening all cardboard and fibreboard boxes. The "Flash Box Opener" has two sides forming a right angle to fit on the package to be opened, one side on the top and the other on the side of the box. Inside the angle formed by the sides of the tool is a sharp knife-blade. The mounting of this slides in a vertical direction and may be adjusted by means of a wing-nut at any desired distance from the top of the box.

By this adjustment the tool can be set to cut off the lid without touching the contents. The shaped hand-grip enables the tool to be operated quite easily and without much effort even on heavy solid fibreboard cases. It is cast in a rustless white metal alloy, and supplied complete with box of spare blades.

The Amal Bunsen Burner

Imperial Chemical Industries, Ltd., have sent us details of the new Amal Bunsen Burner, to which some further small but important modifications of the main principle have been made by the manufacturers. These new features include a pressure-damping device, enabling the flame to be turned down still lower, and the provision of a set of detachable heads, which now equip it to meet practically every laboratory heating requirement.

It is stated that the burner will give as small a flame as an Argand for purposes of evaporation and gentle charring, a compact and stable hot flame with the unburnt zone confined to the base of the flame, as in the Meker, and a large flame for boiling or distillation in large vessels.

The Amal Bunsen Burner showing set of detachable heads.

The Tru-Tite Can

The Continental Can Company has recently announced the introduction of the "Tru-tite" key-opening can for fruit, vegetables, and fish. This new type of can is understood to have a number of advantages over the older type of sealed can. Consumer convenience is increased through the added ease of opening, while the smooth edges ensure safety. There is no spoilage and no damage to the contents in opening, as the can has its full body height before and after opening. The standard one-quarter inch tearing strip maintains the strength of the can and eliminates breakage in opening. Lastly, the "Tru-tite" leaves a smooth edge for friction closure which preserves the remaining contents and gives the container a secondary use in the home.

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The Agent-General for South Australia informs us that as from July 29 the office has been located at British Industries House, Marble Arch, London, W. 1. The new telephone number is Mayfair 5061/2. The registered telegraphic address "Icarian" remains unchanged, but the indicator "Estrand" has been replaced by that of "Wesdo".

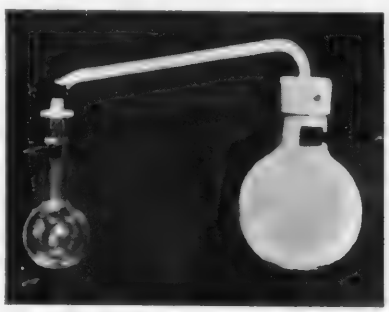
Taring Scales

We have received from A. H. Hewitt, Taring Scales Department, Worksop, Notts, England, a circular descriptive of these scales, which are used extensively in the confectionery trade, in the chemical trade, and also in the paint trade for essences and colours, oils and varnishes, as well as in many other trades where containers are used. To operate these scales the container is placed on the scale when the dial finger moves to the weight of the container. By means of a lever put the tare point to dial finger and then fill to any net weight required on the outer (red) dial. No weights and no keys are required nor is any setting necessary. The scales are made in a large range of models for varying ranges of weights; the smaller models are counter or bench machines and the larger floor platform machines. It is stated that a 14-lb. scale saves lifting 12½ tons a day when filling 7's of jam, etc.

Vitreosil Water Distillation Apparatus

Very pure distilled water is needed in many small-scale manufacturing operations as well as in laboratory work. Assuming that the feed water is of reasonable quality, an important factor affecting the purity of the distillate is the material of which the still and condenser are made. In addition, condensers may need to be run hot to prevent gases originally dissolved in the feed from being redissolved in the condensate. This may affect the resistance of the condenser material to attack.

A notable example of the production of very pure distilled water is that described by Professor Kendall, F.R.S. (*J. Amer. Chem. Soc.*, 1916) for the production of conductivity water at one distillation, using Vitreosil apparatus.



The Vitreosil Apparatus for Water Distillation.

Vitreosil (pure fused quartz or silica) is stated to be unique in its resistance to acids and to heat, and this is an interesting example of its use for the production of a highly purified product. The ground cover of the 2-litre distillation flask carries the condenser tube and provides a good all-silica connection.

Niagara Screens

We have received from Niagara Screens (Great Britain), Ltd., a copy of a new catalogue they have compiled, which illustrates and describes the Niagara Counterflow Roller-Bearing Vibratory Screen. The catalogue, which contains twenty-six pages of art paper, is well illustrated and fully descriptive of the various types of screens.

The screens made by this company are exceedingly popular among various industries where screening or the separation of materials according to size has to be carried out. It is claimed that the rotating motion of the Niagara Screens not only combines all the advantages of the revolving and shaker type screens previously used, but produces results in capacity and efficiency of screening hitherto unobtainable. The smaller sizes of screens for use with powders, chemicals, etc., are prepared with absolutely dust-tight sheet steel housings attached directly to the side plates of the screen and vibrating with it.

Rotoklene Strainer

In the food industry it is often necessary to strain fluids, and a number of strainer designs have been put on the market which are cleanable, with a certain amount of success, without interrupting the flow of the liquid through the strainer. The Rotoklene Strainer, made by Ashworth and Parker, Ltd., Riverside Works, Bury, Lancs, is a new type working on a novel principle. This new strainer is of simple design, is strongly constructed, and has such ample wearing surfaces that it can be operated continuously by belt or motor drive where constant cleaning is necessary. The new winding wire is strong, offers a minimum resistance to flow, and does not become choked. Straining down to $\frac{1}{2,000}$ in. can be obtained without diminution of strength, and it is adapted for use on the highest pressures.

In addition to the usual applications in connection with water and aqueous solutions, these strainers may usefully be employed for lubricating and fuel oils, starch, dyes, size, inks, chocolate, sugar solutions, paint, soap, rosin, pitch, bitumen, and many other liquids or semi-liquids which present difficult straining problems.

Laboratory Glassware

British Standard Specifications have recently been issued for Graduated Measuring Cylinders, Crow Receivers, Nessler Cylinders, and Petri Dishes. These specifications include requirements governing the quality and the dimensions of the apparatus, and the committee responsible for their preparation have been working in close co-operation with the National Physical Laboratory.

The National Physical Laboratory has indicated that it is prepared to accept measuring cylinders, crow receivers, and Nessler cylinders for examination for conformity with the British Standard Specifications. Copies of the specifications may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1.

Rotenone-containing Preparations

We have received from the technical laboratories of Stafford Allen and Sons, Ltd., an extremely useful booklet dealing with Rotenone-containing preparations for use as insecticides.

For insecticidal purposes these fish poisons can be used in the form of dusts, extracts emulsified with water, and aqueous suspensions of very fine dusts. Of these three the last-mentioned method is the most economical, and, if appearance of the plants sprayed is of very little importance, is the best, for the fine layer of particles left on the foliage by the wash retains its activity for a greater length of time than films of extracts.

Information is given on dilutions, with a view to determining the concentration of rotenone necessary to kill various pests; on methods of application, both in a fluid and dust form; and on the best methods to use against particular beetles, flies, and animal parasites.

British Standard Specification

A new specification for laboratory incubator, water bath, and oven thermometers has been issued and is obtainable from the British Standards Institution, 28, Victoria Street, London, S.W. 1, post free for 2s. 2d.

Automatic Controllers

Negretti and Zambra, of 38, Holborn Viaduct, London, E.C. 1, have sent us a copy of their booklet on *Temperature, Humidity, and Pressure Controller*. This booklet is extremely well produced on art paper and contains sixty-four pages with many illustrations and full descriptions of the company's products.

These controllers are suitable for use with any industrial process. The Automatic Temperature Controllers, with which most of the booklet deals, will maintain a product at any desired temperature by controlling the heating (or cooling) medium. They can be used with steam, water, gas, or electricity, etc., and they will regulate the temperature much closer than can be done by hand. All loss or damage due to over or under heating is avoided, a uniform quality is assured and a considerable saving in fuel and labour costs effected. Where desired they can be fitted with an attachment so that the temperature is automatically varied according to any pre-arranged plan.

The Mond Nickel Company

We have received from the Mond Nickel Co., Ltd., a copy of a letter written by Mr. R. C. Stanley, President of the International Nickel Co. of Canada, Ltd., to the shareholders. In this he points out that more nickel is currently going into the numerous fields of peacetime activities than ever went into the world's battlefields. In refuting the charge that the company is trafficking in war material, he says: "Every person who has expended thought, energy, or money in the development of nickel has cause for pride in the record your company is making in a world at peace".

Nickel is, of course, largely used in the processing and handling of foods on a mass production basis as well as in many other industrial processes.

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All the generalised information about copper, which the ordinary user is likely to need, has been collected and issued in the form of a convenient engineers' notebook by the Copper Development Association, Thames House, Millbank, London, S.W. 1, from whom copies can be obtained free of charge on application.

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Following the recent death of Mr. Walter Braby, chairman of Frederick Braby and Co., Ltd., Mr. Cyrus Braby has been appointed chairman and Mr. Ivon Braby has been made deputy-chairman. Mr. Robert M. Nicol, who joined the firm in Glasgow, and was manager of the Bristol branch, has been asked to join the board.

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Strong and persistent rumours prevail in South Wales iron and steel circles that an arrangement has been made by the Government with Richard Thomas and Co., the tinplate combine, as a result of which the company's works in South Wales will not be removed to Redbourn, Lincs.

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Hugh Griffiths, chemical engineer, has changed his address from Grosvenor Gardens to 16, Queen Anne's Gate, London, S.W. 1; telephone No., Whitehall 8271.

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Robert Jenkins and Co., Ltd., engineers, boiler-makers, etc., of Rotherham, inform us that the telephone number of their London office is now Abbey 6327.

INFORMATION and ADVICE

Shrimp Processing—Tomato Salt—Canning of Prunes—Plum Sauce—Confectioners' Icing—Jam Troubles

Shrimp Processing

1,926. *Some weeks ago you kindly gave us some particulars regarding shrimp processing. We have now carried out a considerable number of experiments and find that the practice you referred to is probably better suited to shrimps in tins rather than in glass.*

For our product in glass it is most important that the temperatures employed should not be such as to cause discoloration of the shrimps, and this we find to occur before we reach the 240° to 250° F.

Can you kindly let us have further information on the following:

(1) *As 250° F., and even 240° F., for one hour causes discoloration, should processing at 220°F. provide good keeping qualities, and how long would you recommend temperature to be held?*

(2) *What is the best way of avoiding liquid developing in the glass during the processing of the shrimps, although they are externally dry when put in?*

(3) *What are the usual processing temperatures and times mainly employed in this country for dry shrimps in 6-oz. glass tumblers, and what is the average time for which the product may be expected to keep good?* (England.)

We think that we have already referred you to the article in the November issue (1934) giving a general account of American practice in shrimp canning. In this article reference was also made to the packing in glass, and the times and temperatures were given, but you state in your letter that 240° to 250° F. destroys the colour.

As we have not details of your treatment before packing, it is difficult to give any advice on this point. We understand that the usual American practice is that before plunging in brine—that is to say, cooking for seven to eleven minutes in brine of 1 lb. salt to a gallon of water—the shrimp meats are white, and after plunging they become a red colour.

It seems that this question of red colour is bound up in some way with the brining of shrimps, and is not altogether dependent on the temperature used for processing.

All you can do in this case is to make some tests to find out what effect brining has on the colour. It is, of course, possible that a lower temperature—for example, 220° F.—would prove just as effective in destroying bacteria, but one cannot say with any certainty that this is so. All you can do is to try it out and test the keeping qualities of the product. This can be done by storing the product for a considerable period of time to see if any deterioration takes place, or by speeding up the test by use of an incubator. This is best done by a bacteriologist, and if you decide to have such a test made, we could recommend a bacteriologist who would be willing to carry it out.

As regards avoiding a liquid developing in the glass, we cannot see how you are going to get over this as the moisture is originally contained in the shrimps themselves, and on processing this moisture is driven out and condenses on the inside of the container.

Tomato Salt

1,927. *We have before us a sample of concentrated compound tomato salt. As we are practically in the heart of the tomato district of British Columbia, we are in a preferred position for the manufacture of a salt such as this and would appreciate any information you could give us as to processing, etc.* (Canada.)

Directions were given for making a concentrate such as is required. Briefly, it consists in preparing a seedless pulp, adding about half the weight of salt of the original tomatoes, and thoroughly incorporating, and then gently simmering to the desired consistency.

This may be dried in the usual way at about 120° F. for preparation of the dry salt.

Canning of Prunes

1,928. *I understand that difficulty has been experienced in the past with regard to the canning of prunes in syrup owing to the corrosion of the cans. Could you give me any information concerning recent developments and results of researches?* (Australia.)

A considerable amount of work has been done on this subject by Professor Cruess, of California, and your best plan would be to get in touch with him. In the meantime, some guidance may be obtained from the following summary of his recommendations, as the subject is too extensive to be dealt with by correspondence.

The following procedure, based on the results of investigations, is recommended for use in the commercial canning of prunes:

Sound French prunes of good quality should be washed in cold water and then blanched five to ten minutes in boiling water.

The blanched fruit should be filled into plain or charcoal plate cans.

Cane sugar syrup, 20 to 30 per cent., should then be added to the cans as directed below:

In adding syrup, the canner should allow considerable head space. Depths of head space recommended are given in a special table.

The cans should then be exhausted for ten minutes at 210° F. and sealed. The sealed cans may then be cooked in an agitating cooker or vat. One hour at 212° F. is recommended for 2½ or smaller cans, and one and a half hours for No. 10 can. After cooking, the cans should be cooled about three minutes in cold water. It is inadvisable to store canned prunes for long periods.

The safest procedure is to can and ship prunes only as orders are received. However, if it should be necessary to store the cans for some time, the place of storage should be cool and dry.

The marketing possibilities for canned prunes appear to be good, but commercial production has not increased appreciably because of spoilage losses from swelling of the cans with hydrogen gas, formed by corrosion.

Corrosion and hydrogen swelling are apparently influenced by a number of factors, both chemical and physical in nature.

Swelling of enamel-lined cans was more rapid than of coke-plate cans; that of charcoal-plate cans was slower than that of coke-plate cans.

The procedure used in drying prunes apparently has no effect on the rate of swelling. Canned sun-dried and dehydrated prunes swelled at the same rate.

When the time or temperature of steam or water blanch was increased the rate of swelling increased.

The rate of swelling decreased when the concentration of syrup used was increased. However, 30 per cent. of syrup was found to be the maximum sugar concentration that could be used because more concentrated syrups caused the prunes to harden and shrivel.

The rate of swelling decreased when the depth of head space was increased. A comparatively large head space should be used, as this provides additional space for collection of the hydrogen gas.

An exhaust in steam for ten minutes at 210° F. was found best.

The kind of gasket used had little effect on the rate of swelling; paper gaskets and rubber compound gaskets gave similar results.

Cooking for one to one and a half hours in boiling water was found best for canned prunes. Pressure cooking increased the rate of spoiling.

Decreasing the *p*H value of the syrup retarded the rate of swelling but not of corrosion, and it affected the colour of the prunes adversely.

Factory tests confirmed all the major findings of laboratory experiments.

Canned prunes should be distributed very soon after packing. If storage is necessary, the storage temperature should be as low as practicable, in order to retard corrosion.

Plum Sauce

1,929. *Could you kindly give me a real good formula for plum sauce?* (Australia.)

One was offered as a basis, using malt vinegar, say 50 gal., 50 lb. of stoned plums, and 3 lb. of gum tragacanth. Table salt, white sugar, and ground ginger are incorporated to taste, as well as red colouring matter to impart a pleasing shade. The plums are simmered and passed through the pulping machine. The gum is soaked in part of the vinegar and then placed in a steam-pan. Add the vinegar, sugar, etc., and stir and bring to the boil. Add the pulp and ginger and stir and gently bring to the boil. Fill hot and cap after straining and again bringing to the boil.

Confectioners' Icing

1,930. *Could you supply a formula for preparing an icing for confectioners, using, if possible, ordinary granulated sugar diluted with a small quantity of corn starch?* (England.)

There are various formulæ, but we have yet to come across a really satisfactory one. Try a mixture of 1 lb. sugar with 8, 4, and 2 oz. cornflour, using 3 to 4 oz. of boiling water.

Jam Troubles

1,931. *We would feel greatly obliged if you would tell us a little more about pectin. We buy a brand in 40-lb. tins.*

According to you, it contains about 5 per cent. of pectin. Is the body of the syrup apple juice boiled down, or what is it, please?

Again, it is stated to have a setting quality of 1 lb. to 5 lb. of sugar. Does this mean the limit beyond which one must not go? We commonly use it in the proportion of 1 lb. to 10 lb. of sugar.

Lastly, these questions lead to a point about which we would like some information. It is this: We find on the market jams made by the leading manufacturers, of a cheap nature containing a large proportion of some kind of jelly, and it occurs to us that this kind of jam may contain a large proportion of commercial "pectin". So our last question resolves itself into this: Can one successfully use unlimited quantities of commercial "pectin" in making jam, or, if not, how is all this jelly obtained in making the cheap jam referred to? The particular jam we have in mind is "Raspberry", made by a firm in Great Britain. This firm puts up the highest quality jams at a high price, with their own name on the label, but they also place the cheaper "jellied" jam without any name except a slip printed "Raspberry".

We ourselves think that the "pectin" may be used in extra quantity as our queries suggest, though, of course, the product would not be a well-made jam. But we have one customer—a large multiple shop firm who buy a couple of tons a week—but although our quality is better, they buy much more of the other cheaper jam (and it is by no means a bad jam).

It may seem strange that we do not know more about commercial "pectin", but our boiler goes by experience and his old recipes. The writer thinks that some jam boilers well able to produce perfect jam have very limited knowledge of the fundamental scientific facts underlying the making of jam. (Ireland.)

We think that probably your product is apple pectin. This is obtained not from apple juice, as you suggest, but from the pomace or residue after the juice has been

pressed. The pomace is extracted with dilute acid, and the solution concentrated in vacuum.

The setting power of commercial pectins may be numerically stated in terms of the number of pounds of sugar which may be set into firm jelly produced under standard conditions by 1 lb. pectin. In your case, 1 lb. of pectin will set 5 lb. sugar (dissolved in 1½ lb. water) into a *firm* jelly, but not more than 5 lb.

The reason you can obtain a good set in a jam using 1 lb. pectin to 10 lb. sugar is because of the natural pectin in the fruit, but if you tried to make the same jelly, replacing the fruit with water, you would obtain either a very "floppy" set, or else no set at all. The stated setting power of pectin in pounds of sugar per pound of pectin is really only of use in comparing samples. For instance, a pectin of a sugar-carrying power of 10 lb. to 1 lb. of the pectin would be twice as strong as yours, and you would only need to use half the quantity in your jam.

Regarding your last enquiry, we would like to point out that the mere fact that a jam has a large proportion of jelly does not mean that less fruit and more pectin has been used—as, for example, jelly marmalades. In the case of raspberry and plum jams, it is common practice to remove some of the seeds or stones by sieving. The amount of pectin which may be used is, however, unlimited as you say, and a perfectly satisfactory jelly can be obtained by using only pectin, sugar, and acid.

In your case you would need to use about 10 lb. of pectin to 50 lb. sugar, and 1½ gal. of water. This is the one extreme of cheapness, and at the other we have a jam (or jelly) made entirely of fruit and sugar, with no pectin.

In practice any quantity of jam may be made by working between these two limits, but with due regard to flavour and appearance, and a reasonable amount of fruit used even in very cheap jams.

NEW COMPANIES

A. J. Treadwell and Sons, Limited. 14 and 14a, Allen Road, Stoke Newington, N. 16. To carry on the bus. of grocers and provision mchts., etc. Nom. Cap.: £6,000 in £1 shares (250 "A" and 5,750 ord.). Dirs.: A. J. Treadwell, 56, Queen Elizabeth's Walk, Stoke Newington, N. 16 (ch. and permt. gov. dir.); A. H. Treadwell, 70, Kelvin Avenue, Palmer's Green, N. 13; L. E. Treadwell, 96, Pasteur Gardens, Edmonton, N. 18.

Avanti Trading Company, Limited. To carry on the bus. of mchts in food products, etc. Nom. Cap.: £2,000. Dir.: F. B. Bates, 5, Chaucer Road, Ashford, Middlesex.

A. Wilkinson (Hull), Limited. Humber Dock Street, Hull. To carry on the bus. of fruit and vegetable mchts., etc. Nom. Cap.: £1,000 in £1 shares. Permt. dirs.: H. Glaister, 46, Tufnell Park Road, N. 7; A. Wilkinson, 11, Berceau Walk, Walford.

Chas. E. Swales and Company, Limited. 36-38, Crown Street, Hulme, Manchester. To take over the bus. of wholesale grocers cd. on at Manchester as "Chas. E. Swales and Co." Nom. Cap.: £10,000. Permt. dirs.: C. E. Swales, 38, Heaton Moor Road, Stockport; R. W. Swales, 14, Litherland Road, Sale Moor, Ches.

Courtenay-Hayes, Limited. To acquire the assets of the firm of Courtenay-Hayes, and to carry on the bus. of mnfrs of and dlrs. in chocolates, etc. Nom. Cap.: £350. Dir.: Col. W. Hunt, 41, Old Bond Street, W. 1.

D. G. Binnington and Company, Limited. To take over the bus. of aerated water mnfrs. and mineral water and bottlers' engineers, etc., cd. on at 131-145, Regent Street, Hull, as "Exors. of D. G. Binnington" and "Binnington and Co." Nom. Cap.: £5,000. Permt. dirs.: N. T. Binnington, Langholme, New Road, Willerby; E. G. Binnington, 200, Pickering Road, Hessle High Road, Hull.

Exox Company, Limited. 33-5, Gildart Street, Liverpool. To take over the bus. of mnfrs. of cooked meats, canned goods, Exox fluid beef, etc., cd. on at Liverpool as the "Exox Company". Nom. Cap.: £5,000 in £1 shares. Permt. dir.: H. Rhodes, Wilmot Croft, Crosby Road, Waterloo, Liverpool.

Francis Nicholls and Baragwanath (Spalding), Limited. 32, Hall Place, Spalding. To carry on the bus. of fruit, vegetable, and produce mchts., etc. Nom. Cap.: £10,000. Dirs.: F. W. Nicholls, Brookfield, Wolverley, near Kidderminster; G. J. Harris, 71, Whitmore Road, Small Heath, Birmingham; A. A. Collier, Wedgecote, Pinchbeck Road, Spalding.

Gandolfo, Limited. 29, Victoria Road, Widnes. To take over the ice-cream bus. cd. on by H. and A. Gandolfo in Widnes and other places. Nom. Cap.: £1,500.

Haworth and Sons (Nelson), Limited. Forest Street, Nelson. To carry on the bus. of brewers, mnfrs. of and dlrs. in beer, wines, spirits, mineral waters, etc. Nom. Cap.: £2,000. Dirs.: I. Haworth, 30, Surrey Street, Nelson; A. Haworth, ditto; G. Haworth, Merova, Wheatley Lane, Nelson; H. Haworth, 11, George Street, Nelson; Bertha Bradbury, 101, Reedyford Road, Nelson.

H. D. Gibb, Limited. To carry on the bus. of. wholesale grocers, bakers, etc. Nom. Cap.: £1,000 in £1 shares.

John Kay, Limited. To take over the bus. of John Kay, Ltd. (in voluntary liquidation), and to carry on the bus. of grocers, provision mchts., etc. Nom. Cap.: £200,000. Dirs.: J. J. Kay, 14, Montpelier Road, Ealing, W. 5; W. N. Overland, 39, Mount Avenue, Ealing, W. 5; A. G. Morris, 19, The Ridgeway, Acton, W. 5.

L. Tilbury and Son (Tolworth), Limited. 396, Ewell Road, Tolworth, Surrey. To take over the bus. of a baker and confectioner cd. on by L. Tilbury at Tolworth. Nom. Cap.: £2,000. Dirs.: L. Tilbury, St. Johns, Bryanstone Avenue, Stoughton, near Guildford; C. J. Tilbury, 396, Ewell Road, Tolworth, Surrey.

Parkes (Classic Confectionery), Limited. To take over the bus. of a mnfr. of and dlr. in confectionery cd. on by A. Parkes at Langley Green, Birmingham. Nom. Cap.: £50,000. Dirs.: A. Parkes, 137, Sandon Road, Edgbaston, Birmingham; H. V. Stobbs, Myrtle Mount, Elm Grove, W. Hartlepool.

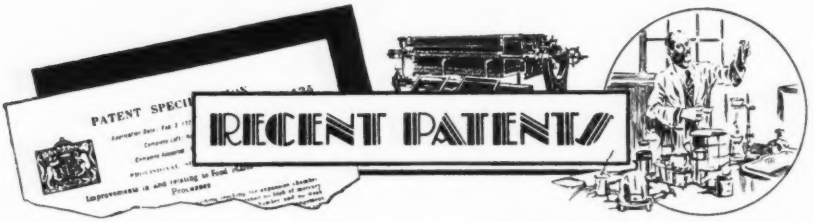
Radcliffe, Boulter and Company, Limited. 258, Rathbone Road, Liverpool. To carry on the bus. of bakers, confectioners, etc. Nom. Cap.: £3,000. Permt. dirs.: S. Radcliffe, 258, Rathbone Road, Wavertree, Liverpool; H. Boulter, 20, Orleans Road, Old Swan, Liverpool.

Sabini Brothers, Limited. To carry on the bus. of mnfrs. of and dlrs. in ice-cream, biscuit mnfrs., etc. Nom. Cap.: £500. Dirs.: A. Sabini, 12, Eskrick Court, Bolton; G. Sabini, 12, Eskrick Court, Bolton; V. Sabini, 12, Eskrick Court, Bolton.

Victoria Park Bakery Company, Limited. 61, Corbett Street, Smethwick. To take over the bus. of bakers and confectioners cd. on at 61, Corbett Street, Smethwick. Nom. Cap.: £2,500. Dirs.: A. Hawley, 343, Pershore Road, Edgbaston, Birmingham; D. Roy, 118, Northfield Road, King's Norton, Birmingham; A. E. Robbins, 68, Woodlands Road, Warley, Birmingham.

Winchester Meat Products, Limited. To carry on the bus. of meat canners and bottlers, etc. Nom. Cap.: £5,000. Subs.: Joan D. Wallace, Manfield House, 376, Strand, W.C. 2; Joan Mickie, Manfield House, 376, Strand, W.C. 2.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

18173. Carpmael, A. (I.G. Farbenindustrie Akt.-Ges.): Manufacture of vitamin preparations. June 25.
18605. Burgess, A. F. (Kraft Egg Machine Co.): Machine for grading eggs. June 28.
18697. Peltzer, A.: Manufacture of starch. June 29.
18937. Hansen, D. A.: Treatment of whale meat, etc. July 2.
19043. Robertson, T. A.: Preserving fruit and vegetables. July 3.
19569. Bromhead, W. S.: Cream products. July 9.
19883, 19884. Rowntree and Co., Ltd., and Todd, J. W.: Manufactured articles of food, etc. July 11.
20273. Pauley, A. J.: Containers for food, etc. July 16.
20321. Ravenscourt, E. H.: Manufacture of cheese. July 16.
20397. Schou, H.: Production of margarine. July 17.
20534. Gilbert, W.: Devices for aerating in mixing-machines. July 19.
20560. Morris, S.: Dehydration of vegetable products. July 19.
20693. Tennant, W. J. (Wins): Preservation of marine-animal products. July 30.
20792. Aktieselskabet Dansk Gaerings-Industri: Treatment of materials containing proteolytic enzymes. July 22. (Denmark, October 26, 1934.)
20818. Diefenbach, A.: Process for opening up cocoa beans. July 22.
20941. Bostock, B. R., and Southern Whaling and Sealing Co., Ltd.: Recovery of dried meat products from whale meat, etc. July 23.
20942. McCorkindale, W. H.: Butter-churning means. July 23.
20981. Davis, R. J. G.: Manufacture of tea. July 24.
21039. Autoxygen, Inc.: Preservation of food substances. July 24. (United States, August 1, 1934.)
21249. Platte, J. A., and Vries, G. H. de: Processes for crystallising sugar solutions. July 26. (Holland, September 14, 1934.)
21357. Doyle, J. D., and Doyle, M. K.: Preservation of eggs. July 27.
21452. Chirstiansen, E., and Ericsson, C. O.: Pie moulding, lidding, etc., machines. July 29.
21472. Carlton, G.: Discharge means from tea-drying machines. July 29.
21672. Worthington, J., and Tallant, O. J.: Containers for food, etc. July 31.
21716. Cow and Gate, Ltd., and Gates, W. R. B. St. J.: Drying milk, etc. July 31.
21760. Aasted, K. C. S., Boggild, C. B. K., and Jacobsen, M.: Treatment of chocolate, etc., substances. July 31.
21767. Urban, A.: Containers for ice-cream, etc. July 31.
21919. Himmelsbach, H.: Manufacture of beverage from whey. August 2.
22056. Weightman, J. S.: Coolers for beer, etc. August 3.
22136. Mobley, L. K.: Milk products. August 6.
22270. Mayer, H.: Composition of matter as food for stock and plant life. August 7.
22282. Marshall's Tea Machinery Co., Ltd., and Marshall, H. D.: Tea-rolling machines. August 7.
22308. Bouckley, Ltd., F., and Bouckley, F. T.: Bakery setting, etc., tin. August 7.
22325. Nygaard, J. O.: Drying whale, etc., flesh. July 26, 1934.

Complete Specifications Accepted

427,797. Reid, R. G., and Danks (Netherton), Ltd., H. and T.: Pasteurising apparatus.
429,412. Boer, F. de: Apparatus for pasteurising milk and the like. (June 30, 1933.)
429,495. Magnus, H. F.: Squeezers for extracting juice from fruit.
429,514. Allardice, D. J., and Whiteside, H. S.: Stoning of fruit.
431,143. Schmalfuss, Dr. H., and Werner, Dr. H.: Edible extracts from the flesh of sea animals.
431,389. Creamery Package Manufacturing Co., Ltd., and Yates, H.: Apparatus for pasteurising liquids.
431,655. Fawcett Preston and Co., Ltd., Macgillivray, J. C., and Chapman, G.: Sugar-cane and other rolling mills.
431,688. Naamlooze Vennootschap Industrieele Maatschappij Voorheen Noury and Van Der Lande: Manufacture of yeast.
431,694. Smart, J. H.: Packing of fish for transit.
431,804. Continental Can Co., Inc.: Manufacture of cereal beverage products.
431,868. Hennesey, J. de L., Sahlin, N. A., and Nilssen, R.: Process and apparatus for preserving perishable products, especially milk and the like, by freezing.
431,939. Greenslade, W. R.: Pasteurising or sterilising apparatus.
431,994. Johansson, K. A., and Wallstrom, J. A.: Preservation of meat, pork, fish, or the like.
432,075. Knutsen, J. B. M.: Method of and means for the economic production of milk powder from whole milk.
432,137. Valentin, Ord, and Nagle, Ltd., and Nagle, J. C.: Packing of invert sugar and the like.
432,224. Banks, G., and Savage and Co. (Tea Machinery and General Engineers), Ltd.: Tea mill roller cellular discs.
432,244. Mutual Citrus Products Co., Inc.: Process of making pectous material and product.
432,387. Aktiebolaget Separator and Svensjö, N. E.: Process and apparatus for the production of alcohol from sugar beets and other sugar-containing raw materials.
432,396. Dehn, F. B. (Stange Co., W. J.): Condimentation of food products.
432,403. Picka, R.: Process for defecating diffusion juices.
432,552. Bostock, H.: Method and apparatus for preserving foodstuffs, etc., for tanning pelts, etc., for drying and impregnating timber with stain, etc., and for drying any commodity whatsoever.
432,571. Crosse and Blackwell, Ltd., Clayton, W., and Johnson, R. I.: Sealing compositions for cans, jars, and other containers.
432,641. Hepworth, F.: Method of and means for maintaining pressure in liquid-containing vessels such as are used for the storage of beer.
432,664. Leslie, G. M.: Apparatus for grading fruit, vegetables, and other solid substances.
432,694. Jennings, H. W. K. (Borkowsky, A.): Treatment of soya beans and the products obtained thereby.
432,771. Kelle, W., and Carlsson, F.: Process for freeing from fat or oil substances containing fat or oil, such as meat, fish, and fruits.

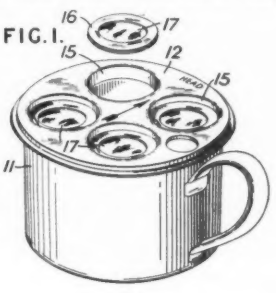
Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

428,073. Group No. III. **Testing milk.** Golding, J., National Institute for Research in Dairying, Shinfield, near Reading, and British Drug Houses, Ltd., 16, Graham Street, City Road, London. Apparatus for testing milk—*e.g.*, for the detection of mastitis—comprises a receptacle 11 having a cover 12 provided with areas of filtering material which is impregnated with one or more colour-change indicators. The cover may, for

FIG. 1.

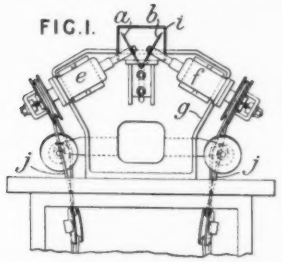


example, have four flanged openings 15 in which are inserted filter elements consisting of discs 17 of muslin impregnated with bromo-cresol purple or bromo-thymol blue which are provided with rims 16 of waterproofed card. Alternatively, the cover may be composed of a layer of muslin secured between two layers of waterproofed card which are cut away to expose portions of the muslin. The cover may be painted black to show up flakes in the milk.

428,110. GROUP VI. **Removing eyes from pineapples.** FOOD MACHINERY (M. AND P.), LTD., and JONES, Q. R., Park Works, Manchester.

A machine for removing the eyes from pineapples comprises two rotating disc cutters *a*, *b* set at an angle to one another. The operator holds the fruit against the knives at the point where they come close to one another, and simultaneously rotates it and moves it axially, whereby a helical track is cut on the pineapple following the usual helical track of the eyes.

FIG. 1.



The knives are covered by an adjustable guard *i*, and the bearings *e*, *f* are mounted on a frame *g* which may be pivoted to the base so that the operator may move the frame towards or away from him to position the cutters in the most advantageous position. The drive to the cutters may be by ropes *j* as shown, or by chains or by self-contained motor-gear unit. According to the provisional specification, the angle between the knives may be adjustable.

428,554. GROUP No. I. **Filters.** GASCOIGNE, G. H., Queensmere, Wokingham, and KNOX, J. R., 7, Brunswick Hill, Reading, both in Berkshire.

FIG. 4.

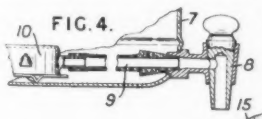
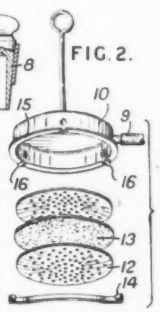


FIG. 2.



A device for filtering milk or other liquid as it is discharged from a vat 7 and through a cock 8, comprises an inverted dished housing 10 with a filtering pad or pads 13, supported between perforated metal discs 12 and held in position by a clip 14 which grips a flange 15 on the periphery of the housing. The housing is spaced from the floor of the vat by projections 16 on the flange 15, and the liquid in the vat rises through the filter and is discharged through a rubber pipe 9, and the cock 8. Instead of the clip 14 as shown, a three-armed clip may be used, which serves to hold the housing clear of the floor.

RECENT TRADE MARKS (continued from p. 338.)

GOODSIGN.—559,380. **Lard (for food).**

GEORGE ROPER AND CO. (IMPORTERS), LTD., Produce Exchange Building, 8, Victoria Street, Liverpool, 2. July 31. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the letters and abbreviations "G. R. and Co., Ltd."

GREENCASTLE POTATOES.—558,785. **Potatoes (for food), the produce of Greencastle, Northern Ireland.** ENGLANDS, LTD., West Bute Dock, Cardiff. July 3.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the word "Greencastle" and the letter "E".

GUZEIHER.—559,547. **Pork, pork pies, pork sausages, pork sausage meat, haslet, pork polonies, pork dripping, pork black puddings, and lard (for food).** WILLIAM LYALLS WATERHOUSE, trading as Zeiher, 85, Broomhall Street, Sheffield, 3. August 14.

HILANDALE.—561,067. **Cheese.** MILLAR, BALL AND TOULMIN, LTD., 81, Fishersgate, Preston, Lancashire. July 24.

JUBILATION. — 560,502. **Tea, coffee, cocoa, chocolates, dried and canned fruits, canned fish, meats, and vegetables (for food).** BUNTING AND CO., LTD., 23, Rood Lane, London, E.C. 3. July 31. (By Consent.)

LIFE GUARD.—561,135. **Tea.** H. KUHN AND CO., LTD., Mincing Lane, London, E.C. 3. August 14.

The above-mentioned goods and goods of a like kind will be struck out from the goods of Registration No. 418,340 (2280) if and before the applicants' mark is registered.

MARVO. — 548,274. **Mushrooms and ground dried mushrooms, all for food.** MARVO MUSHROOMS, LTD., Marvo House, West Street, Farnham, Surrey. July 10. (Associated.)

MASCOT.—561,007. **Tea.** PEEK BROS. AND WINCH, LTD., 20, Eastcheap, London, E.C. 3. July 31.

Registration No. 284,832 (1490) will be cancelled if and before the applicants' mark is registered.

MASTIFF. — 561,252. **Fruits, vegetables (for food), meat, milk, and milk products (for food), fruit juices, and jams.** CARL WOLFF (AGENCIES), LTD., 110, Cannon Street, London, E.C. 4. August 7.

PARACHUTE. — 561,250. **Dried fruits, dates, nuts for food, canned fruits, canned vegetables, and canned fish.** BARROW, LANE AND BALLARD, LTD., Pudding Lane, London, E.C. 3. August 14.

PHROMENTONE.—561,457. **Cereal foods.** ALEXANDER MILLIGAN, Bridlemere, Newmarket. July 31.

PINDAPOY.—556,697. **Fresh fruit, dried fruit, and tinned fruit.**

ARGENTINE NORTH-EASTERN RAILWAY CO., LTD., trading also in the Argentine Republic as Ferrocarril Nord Este Argentino, River Plate House, Finsbury Circus, London, E.C. 2, and Cangallo Street No. 564, Buenos Aires, Argentine Republic. August 14.

PY-DUMPY LAMB.—559,751. **Substances used as food or as ingredients in food, but not including fancy bread and cakes, and not including any goods of a like kind to fancy bread and cakes.**

H. J. HEINZ CO., LTD., Waxlow Road, Harlesden, London, N.W. 10. July 31. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the device of a gherkin and the word "Py-Dumpy".

In use upon goods other than lamb the mark will be varied by the substitution of the name of such goods for the word "Lamb".

REV. — 560,612. **Meat pies.** EDGAR ERNEST REEVES, 1a, Montgomery Street, Sparkbrook, Birmingham. July 24.

RUCHIE. — 560,877. **Wholemeal mixture and bread.** SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY, LTD., 95, Morrison Street, Glasgow, C 5. July 31.

SEGABICS.—560,885. **Biscuits.** SEAGER, EVANS AND CO., LTD., Millbank Distillery, 14, Deptford Bridge, London, S.E. 8. July 31. (Associated.)

SELINE.—558,482. **Canned fruits and dried fruits.**

SCHUCKL AND CO., INC., 260, California Street, San Francisco, California, United States of America. August 14. (Associated.) (By Consent.)

SLOOP. — 561,251. **Dried fruits, dates, nuts for food, canned fruits, canned vegetables, and canned fish.** BARROW, LANE AND BALLARD, LTD., Pudding Lane, London, E.C. 3. August 7.

SOLOX.—558,137. **Suet, and preparations consisting principally of vegetable fats for use as substitutes for suet.** N. KILVERT AND SONS, LTD., Trafford Park Road, Trafford Park, Manchester, 17. August 7.

SPRINGER. — B 556,296. **Margarine for sale in Scotland only.** The firm trading as AITKEN AND WRIGHT, 66, Constitution Street, Leith, Edinburgh. July 24.

User claimed from the year 1894.

SUNNYLAND.—558,513. **Macaroni.** H. SALVARELLI AGENCIES, LTD., 37, Eastcheap, London, E.C. 3. August 14. (By Consent.)

RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

A "SIXER".—561,332. **Beverages (not alcoholic, not aerated, and not medicated).** L. B. W., LTD., 41, Eastcheap, London, E.C. 3. August 7.

BELT BRIDGE BRAND. — 558,844. **Animal and vegetable fats for food.** A/S ESBJERG FEDTRAFFINADERI, Kingosgade 12, Esbjerg, Denmark. July 24. (By Consent.)

Belt Bridge Brand

CAMPFIRE. — 559,877. **Confectionery.** ANGELUS-CAMPFIRE CO., 4800, West 66th Street, City of Chicago, County of Cook, State of Illinois, United States of America. August 14.

Campfire

CARNATION BRAND.—560,438. **Condensed milk and milk products (for food).** CARNATION MILK CO., LTD., 52 to 54, Gracechurch Street, London, E.C. 3. July 24. (Associated.)

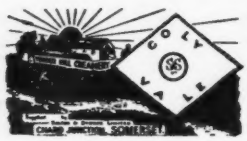
Registrations Nos. 385,690 (2192), 398,187 (2192), and 525,937 (2867) will be cancelled if and before the applicants' mark is registered.

CARNATION MILK. — 560,441. **Condensed milk and evaporated milk (for food) produced in Great Britain.** CARNATION MILK CO., LTD., 52 to 54, Gracechurch Street, London, E.C. 3. July 31. (Associated.)

Registrations Nos. 385,690 (2192), 398,187 (2192) and 525,937 (2867) will be cancelled if and before the applicants' mark is registered.

CHÆLBS. — 560,937. **Biscuits.** JAMES WALTER SOUTHWELL, trading as Southwell's, 16, Church Street, Basingstoke, Hampshire. July 24.

COLY VALE.—559,484. **Substances used as food or as ingredients in food.** SALTER AND STOKES, LTD., 19 and 20, King Street, West Smithfield, London, E.C. 4, and Yonder Hill Creamery, Chard Junction, Somersetshire. August 14. (Associated.)



Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the words "Coly Vale" and the device of cows and pastoral scene.

This trade mark is limited to the colours red, green, white, and black, as shown in the representation on the form of application.

COMPASS.—561,005. **Canned fruits and canned fish.** PEEK BROS. AND WINCH, LTD., 20, Eastcheap, London, E.C. 3. August 14. (By Consent.)

Registration No. 334,825 (1749) will be cancelled if and before the applicants' mark is registered.

COUNTRY MAID.—559,366. **Canned and bottled fruits and vegetables.** EASTERN COUNTIES PRESERVES, LTD., Bridge Road, Long Sutton, Lincolnshire. August 7.

COUNTRY MAID

Registration of this trade mark shall give no right to the exclusive use of the words "Country Maid".

DAISY. — 555,782. **Canned gooseberries, canned strawberries, canned raspberries, canned plums, canned black currants, canned greengages, canned red currants, canned cherries, and canned damsons, all being the produce of England.** A. W. FOSTER AND CO., LTD., The Cannery, Bardney, Lincolnshire. August 14. (Associated.)

The above-mentioned goods and goods of a like kind thereto will be struck out from the goods of Registration No. 47,524 (399) if and before the applicants' mark is registered.

DANTE BRAND.—560,242. **All goods in Class 42, which includes substances used as food or as ingredients in food.** CINI BROTHERS AND CO., LTD., 211, St. George Street, Stepney, London, E. 1. August 14.

DANTE | BRAND

Registration of this trade mark shall give no right to the exclusive use of the letter "C".

Registrations Nos. 455,198 (2471) and 468,899 (2520) will be cancelled if and before the applicants' mark is registered.

DAYTIME.—560,909. **Biscuits.** BEE BEE BISCUITS, LTD., Sunya House, Scrubs Lane, Cumberland Park, Willesden, London, N.W. 10. August 14. (Associated.)

DEL MAIZ NIBLETS.—554,043. **Canned maize.** FINE FOODS OF CANADA, LTD., 605, Bartlett Building, Windsor, Ontario, Canada. August 14. (Associated.)

"DUCHESS" BUTTER. — 560,587. **Butter.** THE DUCHESS OF DEVONSHIRE DAIRY CO., LTD., Tiverton Junction, Cullompton, Devonshire. July 31. (Associated.)

D.W.C. — 550,634. **Oranges, grapefruit, pineapples, tangerines, mandarines, grapes, plums, peaches, apricots, nectarines, apples, pears, tomatoes, potatoes, onions, lemons, melons, grenadillas, mangoes, and bananas, all being fresh fruits or vegetables (for food).** DAN WUILLE AND CO., LTD., Market Building, 100-104, Long Acre, Covent Garden, London, W.C.2. August 7.

Advertised before acceptance, the applicants alleging distinctiveness.

EGGORONI.—560,794. **Food preparations containing eggs.** AVERY'S VERMICELLI, LTD., Oswald Road, St. Albans, Hertfordshire. July 24.

ENTENTE CORDIALE. — 554,062. **Preserved fish, preserved meat, preserved vegetables, and meat pastes.** THURBER WHYLAND, LTD., trading also as G. Costa and Co., Melbourne House, 180-182, Bermondsey Street, London, S.E. 1. July 31. (Associated.)

F.F.V — 560,750. **Cakes and biscuits.** SOUTHERN BISCUIT CO., INC., Corner of 5th and Byrd Streets, Richmond, Virginia, United States of America. August 14. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the letters "F.F.V."

(*Continued on page 337.*)